THEMIS

Installation Manual

RES-NT1-1U

Front I/O Chassis

1RU 19” Rack-Mount High-Performance Computer
with X8DTG-DF Motherboard Configuration
/ Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs
and one NVIDIA M-Class Tesla GPU module

RES-NT1-1U - Front I/O

High-Performance Computer with one NVIDIA M-Class Tesla GPU module

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High-Performance Computer with one NVIDIA M-Class Tesla GPU module

RES-NT1-1U Installation Manual†

Version 1.0— September 2012

* SuperMicro Motherboard X8DTG-DF

†NVIDIA Tesla M-class GPU module

Themis Computer—Americas and Pacific Rim
47200 Bayside Parkway
Fremont, CA 94538
Phone (510) 252-0870
Fax (510) 490-5529
World Wide Web http://www.themis.com

Themis Computer—Rest of World
5 Rue Irene Joliot-Curie
38320 Eybens, France
Phone +33 476 14 77 80
Fax +33 476 14 77 89

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This product complies with the European EMC Directive (2004/108/EC) and the European Low Voltage Safety Directive (2006/95/EC)/.

Safety Precautions

Instructions regarding safety precautions during installation, operation, or maintenance of the equipment are given in the section entitled “Safety Instructions” on page iv.

WARNINGS and CAUTIONS

The definitions of WARNINGS and CAUTIONS as used in this document are given in the Preface in the section entitled “Notes, Cautions, Warnings, and Sidebars”.

Themis Customer Support

North America, South America, and Pacific Rim

Telephone: 510-252-0870
Fax: 510-490-5529
E-mail: support@themis.com
Web Site: http://www.themis.com

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Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.

Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the supplied cables.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when
  - — the device has visible damage or
  - — the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.
- If extensions are made to the device, the legal stipulations and the device specifications must be observed.

- The device must be switched off when removing the top cover; for example, before installing extension (PCI) cards.

Operation of Laser Source Devices

DVD/CD-ROM drives contain laser light-emitting diodes (classified in accordance with IEC 825-1:1993: LASER CLASS 1) and, therefore, must not be opened.

If the enclosure of such a drive is opened, invisible laser radiation is emitted. Do not allow yourself to be exposed to this radiation.

The laser system meets the code of Federal Regulations 21 CFR,1040 for the USA and Canadian Radiation Emitting Devices Act, REDR C 1370.

Note: RES-NT1-1U does not have a factory installed internal DVD/CD-ROM. However, these cautions should be observed if operating an external DVD/CD-ROM.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.

2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

Systems are equipped with a lithium battery installed on the motherboard. To replace this battery, please observe the instructions that are described in this manual.

Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

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Preface

This document, entitled *RES-NT1-1U Installation Manual*, provides instructions on how to install, configure, power up, and boot the Themis High-Performance Computer RES-NT1-1U (see *Figure 1*). Based on two 64-bit Intel® Xeon™ 5500-Series Quad/Dual-Core CPUs or Intel Xeon 5600-Series Quad/Six-Core CPUs with up to 6.4 GT/s each, and one NVIDIA® M-Class Tesla™ GPU module based on the Fermi architecture.

The RES-NT1-1U is based on the SuperMicro **X8DTG-DF** motherboard in a 20”-deep chassis. (A matrix table describing 20” chassis configurations is given in *Table 1*, page xx; for a matrix describing 17” chassis configurations, see *Table 2*, page xxi; a matrix describing 16” chassis configurations is in *Table 3*, page xxii.)

Figure 1. RES-NT1-1U High-Performance Computer

Table 1. RES-*x*2XR3 20”-Deep Chassis Manual Matrix (AC and DC Power Supplies)

Category	Motherboard[a]	CPU Sockets	RES-32XR3 Manual Part Number	RES-22XR3 Manual Part Number	RES-22XR3 with Riser Manual Part Number	RES-12XR3 Manual Part Number
Configuration 1	X8DTH-iF X8DTH-6F	**2**	**116790-024**	**116789-024**		
Configuration 2	X8DTi X8DTi-F X8DTi-LN4F	**2**	**117022-024**	**117017-024**		
Configuration 3	X8DT3 X8DT3-F X8DT3-LN4F	**2**	**117023-024**	**117018-024**		
Configuration 4	X8DTN+	**2**	**117024-024**	**117019-024**		
Configuration 5	X8DAi X8DA3	**2**	**117025-024**	**117020-024**		
Configuration 6*	X8DAH+-F	**2**	**117026-024**	**117021-024**		
Configuration 7	X8DTU-F				**117280-024**	**116970-024**
Tesla Systems	X8DTG-DF		—			**119905-024**

Naming Key: X8D*vwxyz* ● System RES-*x*2XR3, where *x* = 3, 2, or 1

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip
* Configuration 6 motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

w: H = Two Tylersberg Northbridge chips
blank = One Tylersberg Northbridge chip
U = Motherboard with cutout

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—All motherboards measure 12”W x 13”L except X8DTN+ and X8DAH+-F, which are 13.68”W x 13” L.

Table 2. RES-*x*2XR3S / RES-*x*1XR3 17”-Deep[a] Chassis Manual Matrix (AC and DC Power Supplies)

Motherboard	CPU Sockets	RES-32XR3S Manual P/N	RES-22XR3S Manual P/N	RES-12XR3S Manual P/N	RES-31XR3 Manual P/N	RES-21XR3 Manual P/N	RES-11XR3 Manual P/N
X8DTL-6F X8DTL-6	**2**	**117408-024**	**117412-024**	**117416-024**			
X8DTL-3F/-iF X8DTL-3/-i	**2**	**117409-024**	**117413-024**	**117417-024**			
X8DAL-3 X8DAL-i	**2**	**117411-024**	**117415-024**	**117419-024**			
X8SAX	**1**				**117420-024**	**117421-024**	
X8ST3-F X8STE	**1**				**117385-024**	**117422-024**	
X8STi X8STi-F X8STi-LN4 X8STi-3F	**1**					**118188-024**	**117423-024**

Naming Key: X8*uvwxyz*

- System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—The 17”-deep RES XR3 chassis actually measures 17.07” deep, but for simplicity will continue to be referred to as being 17” deep throughout these manuals.

A matrix describing 16”-deep RES chassis that are configured for front-I/O connector and front-PCI card access is given in *Table 3*. This chassis design makes it more convenient to install cables to the system and demands no access to the rear of the chassis except to replace a fan. *Figure 2* shows the front view of a standard rear-I/O RES-22 chassis (*Figure 3* on page xxiii shows the rear view); *Figure 4* shows the front view of a front-I/O RES-22 chassis (*Figure 5* shows the rear view)

Table 3. Front I/O 16”-Deep Chassis Manual Matrix (AC and DC Power Supplies)

Mother-board	CPU Sockets	RES-32XR3/FIO Manual P/N	RES-22XR3/FIO Manual P/N
X8DAH+-F*****	**2**	**117611-024**	
X8DTU-F	**2**		**117664-024**

Naming Key: X8*uvwxyz* ● System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

*RES-32XR3/FIO motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

Figure 2. Front View of a Standard Rear-I/O RES-22 Chassis (Doors Removed)

Figure 3. Rear View of a Standard Rear-I/O RES-22 Chassis

Figure 4. Front View of a Front-I/O RES-22 Chassis

Figure 5. Rear View of a Front-I/O RES-22 Chassis

The 1RU-high (1.75”) RES-NT1-1U has been designed to fit into a standard 19” rack and is provided with rack-mount brackets with handles. *Optional* rack-mount slides are also available. The RES-NT1-1U is rugged enough to withstand extreme shock (up to 35G), temperature, and EMI associated with such demanding markets as the military, aerospace, and telecommunications industries.

The two Intel Xeon 5500-Series CPUs or Intel Xeon 5600-Series CPUs support up to 192 GigaBytes (at 800/1066 MHz) of DDR3 ECC Registered DIMM memory modules; use of 1333-MHz DIMMs result in a lower total capacity. Memory speed is dependent on the type of processor installed on the motherboard.

The RES-NT1-1U is based on the functionality and capability of the following Intel chipset:

- Intel 5520 (Tylersburg) chipset—North bridge
- ICH10R (Southbridge) + IOH-36D

The NVIDIA Tesla M-class GPU can provide up to 665 gigaflops of double precision performance, and up to 1 teraflop of single precision performance, utilizing up to 6 GigaBytes of ECC GDDR5 memory. The NVIDIA Tesla M-class GPU family includes:

- Tesla M2090
- Tesla M2075
- Tesla M2070
- Tesla M2050

Note: For Tesla software and software support, please visit http://www.nvidia.com/object/tesla_software.html.

The desired Tesla M-class GPU module should be specified at time of order. Please contact Themis for assistance in determining the appropriate M-class module for your particular application. Themis customer service can be reached by email at support@themis.com, or by calling 510-252-0870 Mon-Fri 8:00am–5:00pm.

An overview of RES-NT1-1U design and specifications is given in Chapter 1, "Overview and Specifications", of this manual.

This manual is intended for an experienced system administrator with a knowledge of networking, high-speed server systems, and High-Performance Computer systems.

Website Information

Themis Computer corporate and product information may be accessed on the World Wide Web by browsing the website http://www.themis.com.

Your Comments are Welcome

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at **docfeedback@themis.com**. Please include the document part number (119905-024) in the subject of your email.

Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:

Note: A note provides additional information concerning the procedure or action being described.

Caution: A caution describes a procedure or action that may result in damage to the equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.

Warning: A warning describes a procedure or action that may cause injury or death to the operator as a result of hazardous voltages. To reduce the risk, follow the instructions accompanying this symbol.

Sidebar: A “sidebar” adds detail to the section within which it is placed, but is not absolutely vital to the description or procedure of the section.

General Section

Chapter 1

Overview and Specifications

1.1 Overview

The **RES-NT1-1U** is a rack-mounted system designed specifically for above-average shock and vibration environments (see *Figure 1-1* below and *Figure 1-2*, page 1-2; a block diagram is given in *Figure 1-3*, page 1-3). The RES-NT1-1U supports single or dual Intel® 1366-pin LGA Xeon™ 64-bit processors (each with a QPI up to 6.4 GT/s with a 1333-MHz memory bus), and has one NVIDIA M-class Tesla GPU module, ideal for many military/aerospace, commercial, and scientific research applications. Motherboard options are listed in *Table 1-1* on page 1-2.

Figure 1-1. RES-NT1-1U

Table 1-1. RES-NT1-1U Motherboard Options

Mother-board[a]	IPMI	SATA	SAS	Memory Slots	Graphics	Audio	PCI-e, PCI-X, and PCI or UIO Slots				
							PCI-e x16	PCI-e x8	PCI-e x4	PCI-X	UIO
X8DTG-DF	Yes	Yes	—	12	Yes	—	1[b]	—	1[b]	—	—

a—SuperMicro Computer, Inc.

b—PCI-E slot configuration is dependent on system design and does not necessarily reflect all possible motherboard PCI-E slot options.

The RES-NT1-1U is designed within a 1RU-high (1.75”) form-factor, 20” (508mm) deep, and 17.06” (433.3 mm) wide (which, with mounting brackets, fits a 19”-wide rack; see *Figure 1-2*). Major features of the RES-NT1-1U are described in *Table 1-2*, page 1-4

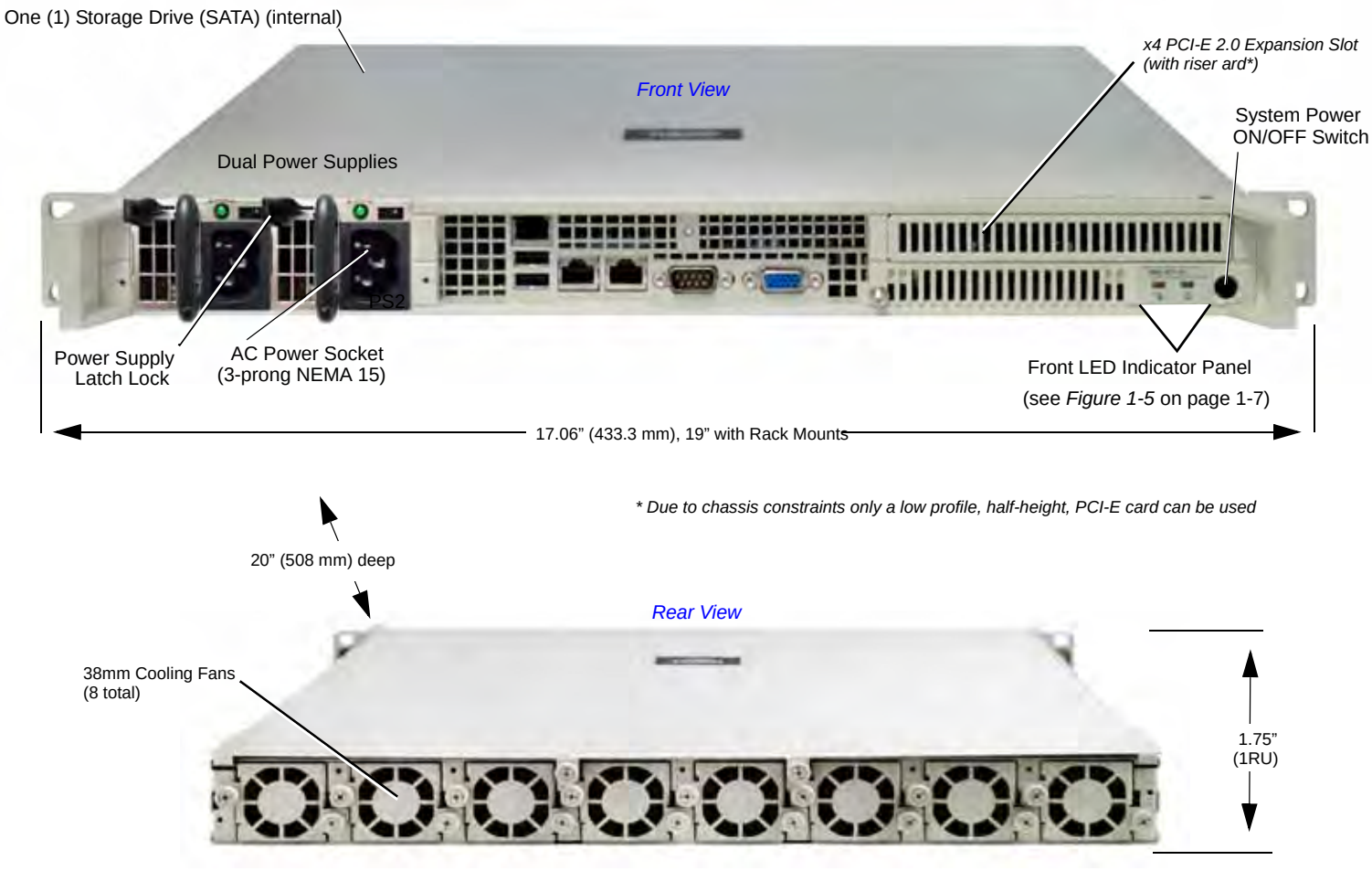
One (1) Storage Drive (SATA) (internal)
x4 PCI-E 2.0 Expansion Slot (with riser ard*)
Front View
System Power ON/OFF Switch
Dual Power Supplies
PS2
Power Supply Latch Lock
AC Power Socket (3-prong NEMA 15)
Front LED Indicator Panel
(see Figure 1-5 on page 1-7)
17.06” (433.3 mm), 19” with Rack Mounts
* Due to chassis constraints only a low profile, half-height, PCI-E card can be used
20” (508 mm) deep
Rear View
38mm Cooling Fans (8 total)
1.75” (1RU)

Figure 1-2. External Features of the RES-NT1-1U (Front and Rear)

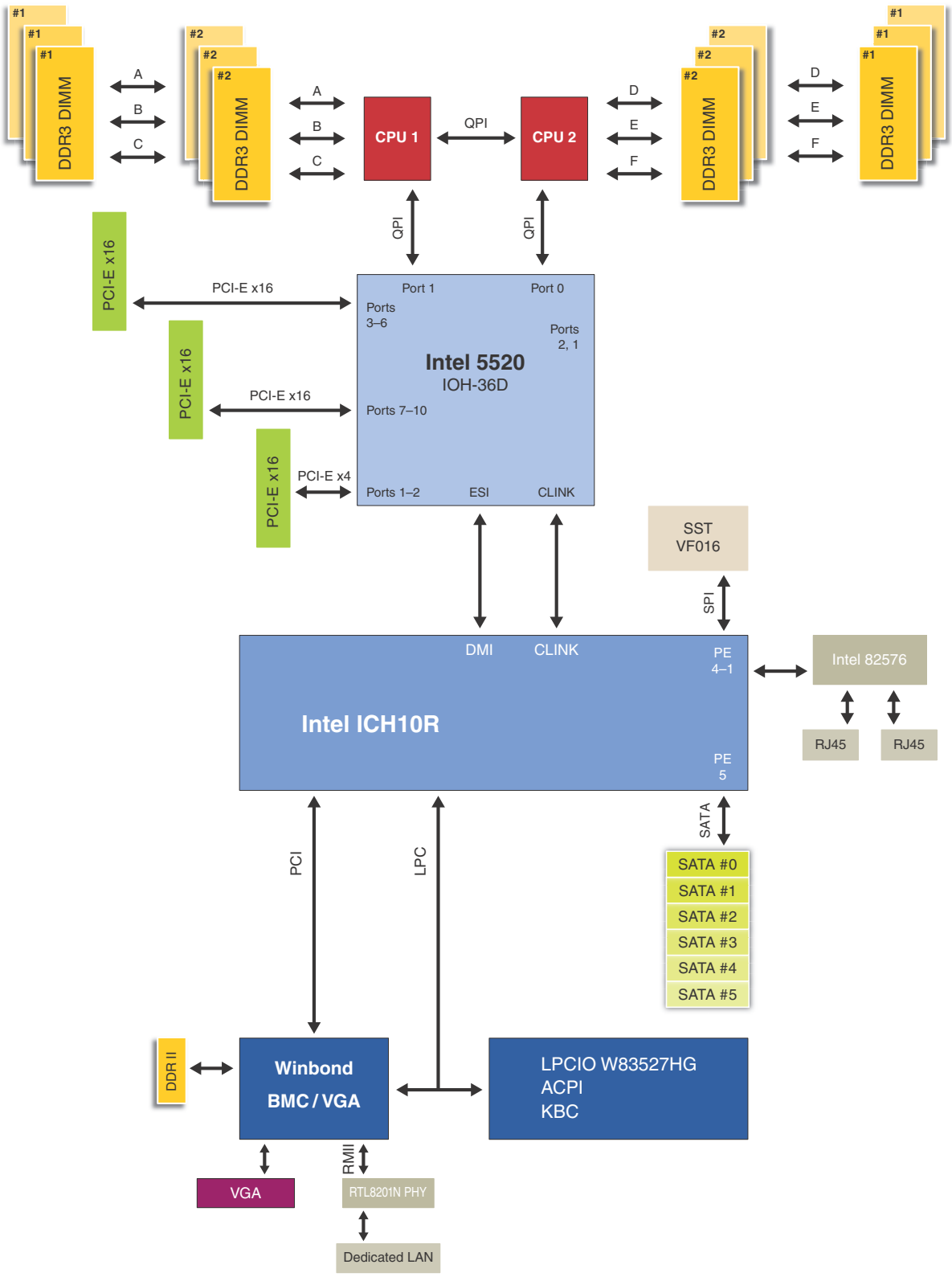

Figure 1-3. X8DTG-DF Motherboard Block Diagram

Included on the front panel is an ON/OFF power button, and system LEDs (see *Figure 1-5* on page 1-6). The front panel also contains an I/O faceplate for one (1) horizontal PCI card (graphics, NIC, etc.), two power supplies with latch locks and power-cord sockets, and all I/O connectors (see *Figure 1-5*).

Major internal components of the RES-NT1-1U can be seen in the open top view (cover removed) shown in *Figure 1-4* on page 1-5.

Table 1-2. Major Features of RES-NT1-1U

Feature	Details
Processor (CPU)	• Two Quad/Dual-Core or Quad/Six-Core Intel® 5600/5500 Series Xeon Processors with QPI (QuickPath Interconnect) up to 6.4 GT/s per direction.
Chipset	• Intel® 5520 (Tylersburg) chipset • ICH10R + IOH-36D
Memory	• Up to 192 GB of 1333 / 1066 / 800-MHz ECC Registered / ECC Unbuffered DDR3 72-bit SDRAM • Twelve 240-pin gold-plated DIMM sockets
Expansion slots	• One PCI-E 2.0 x16 (with riser card; reserved for the NVIDIA Tesla M-class GPU module) • One PCI-E 2.0 x4 (with riser card; Due to chassis constraints only a low profile, half-height, PCI-E card can be used)
Peripheral Support	• One (1) SATA storage drive (storage drive is internal and is not accessible from the outside of the chassis)
Onboard I/O	• 1 serial port (9-pin)—COM 1 (front panel) • 2 USB 2.0 ports (2x USB front ports) • Intel 82576 Gigabit Ethernet controller supports dual Giga-bit LAN ports (LAN 1/LAN 2) • VGA port with integrated Matrox G200eW Graphics • IPMI 2.0 with dedicated LAN and full KVM support
Operating temperature[a]	• 0° up to 50°C (32° up to 122°F)
Shock endurance[a]	• 35G @ 25-msec duration (3 axis)
Dimensions	• 1.75” (1RU) high, 17.06” (433.3 mm) wide (19” / 482.6 mm with mounting brackets), 20” (508 mm) deep
Rack-mount brackets and slides	• Left and right rack-mount tabs are attached to the chassis • Left and right rack-mount slides are *optional*
Dual power supplies	• 750 watts each, auto-ranging (100–265 VAC) • Load-sharing N+1 redundant, hot-pluggable • O*ptional*—Choice of 750-watt (48V) or 500-watt (28V) DC Power supply

a—Specifications are dependent on configuration as indicated in this manual

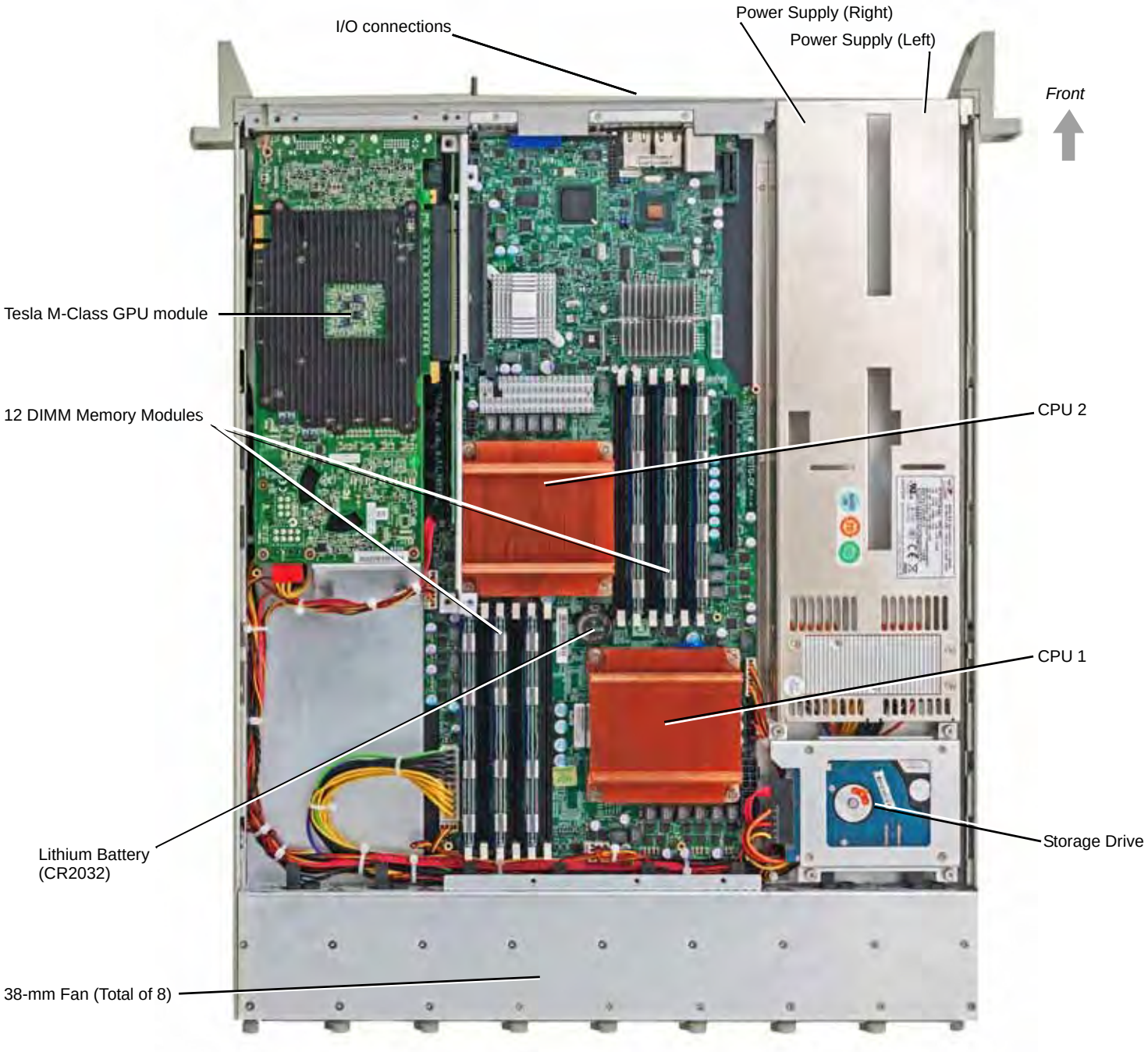

Figure 1-4. Major Components of the RES-NT1-1U (air diverter removed)

1.2 System LEDs and I/O Connectors

All RES-NT1-1U system LEDs are located on the front panel (see *Figure 1-5*); all I/O connectors are located on the front panel (see *Figure 1-5*).

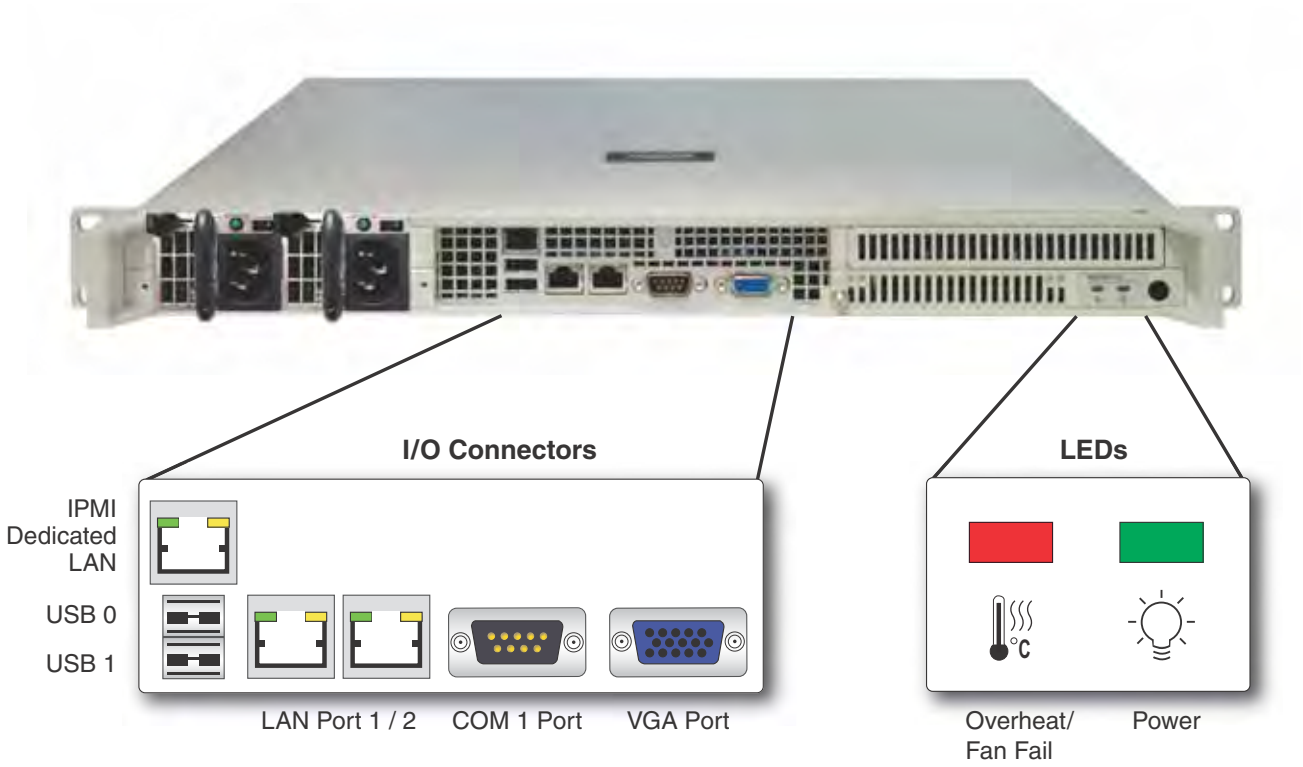

Figure 1-5. RES-NT1-1U System LEDs and I/O Connectors

LEDs are described below in *Table 1-3*, page 1-7; I/O connectors are described in *Table 1-4* on page 1-7.

Table 1-3. System LEDs

Symbol	LED	Description
	Power	• Indicates that the system is turned on.
	Overheat/Fan Fail —Normally OFF —RED light when temperature limits are exceeded	• Warns that the system is exceeding specified temperature parameters. The CPU overheat warning function must be enabled in the BIOS, thus allowing the user to define an overheat temperature, which—when exceeded—triggers the overheat warning LED.
Symbol	**front Panel LED(s)**	**Description**
N/A	LAN1 and LAN2	Each Ethernet port contains two LEDs: • The color of the left LED indicates the LAN connection speed: - Off = 10 MHz - Green = 100 MHz - Amber = 1 GHz • The right LED, when lit, indicates LAN activity.

Table 1-4. Front-Panel I/O Connectors

Connector	Description
USB 0 and USB 1 Hi-Speed USB 2.0 Serial Ports	• Two 4-pin USB connectors used to attach serial devices to USB Port 0 and USB Port 1.
COM 1 Serial Port	• One DB9 (male) connector on front panel to attach a serial device to COM 1port
VGA Port	• 15-pin VGA connector to attach a monitor device.
Ethernet LAN Ports	• Standard RJ45 connectors to attach one or two gigabit Ethernet LAN line(s)—LAN 1 and LAN 2.
IPMI Dedicated Ethernet LAN Port	• Standard RJ45 connector to attach a dedicated IPMI LAN line with full KVM support.
Unit Identifier (UID) Switch	• A Unit Identifier Switch and two LED indicators are located on the motherboard. When the UID switch is pressed, both LEDs are turned on (one LED is located at the rear edge of the motherboard, the other LED is at the front of the motherboard). Pressing the UID again turns off both LED indicators. The UID indicators provide an easy identification of a system unit that may be in need of service. *Note:* The UID can also be triggered via IPMI.

1.3 Chipset Overview

Built upon the functionality and the capability of the Intel 5520 platform, the X8DTG-DF motherboard provides the performance and feature set required for dual processor-based high-end systems. The 5520 platform supports single or dual Xeon 64-bit dual-core processors with QPI™ (Quick Path Interconnect) running up to 6.4 GigaBytes(GB)/second. The Intel chipset consists of:

- the Intel 5520 (Tylersburg) Northbridge chipset, and
- the ICH10R Southbridge + IOH-36D

With the Intel QPI controller built in, the 5600/5500 Series Processor platform is the first dual-processing platform to offer the next-generation point-to-point system interconnect interface, providing substantial system performance by utilizing serial link interconnections, allowing for increased bandwidth and scalability.

The IOH connects to each processor through an independent QPI link. Each link consists of 20 pairs of unidirectional differential lanes for transmission and receiving in addition to a differential forwarded clock. A full-width QPI link pair provides 84 signals. Each processor supports two QuickPath links, one going to the other processor and the other to the 5520 Northbridge.

The 5520 chipset supports PCI-E Gen2 lanes peer-to-peer read/write transactions. In addition, the Intel 5520 platform offers a wide range of RAS (Reliability, Availability, and Serviceability) features. These features include memory interface ECC, x4/x8 Single Device Data Correction (SDDC), Cyclic Redundancy Check (CRC), parity protection, out-of-band register access via SMBus, memory mirroring, memory sparing, and Hot-plug support on the PCI-Express Interface.

1.3.1 The 5600/5500 Series Processor and the 5520 Chipset

- four/six processor cores in each processor with 8MB shared cache among cores
- Two full-width Intel QuickPath Interconnect links, up to 6.4 GT/s of data transfer rate in each direction
- Virtualization Technology, Integrated Management Engine support
- Point-to-point cache coherent interconnect, Fast/narrow unidirectional links, and Concurrent bi-directional traffic
- Error detection via CRC and Error correction via Link level retry

1.4 NVIDIA Tesla

The RES-NT1-1U is based upon the functionality and GPU power of NVIDIA's Tesla M-class GPU module. NVIDIA Tesla cards support a number of CUDA and OpenCL software features, along with NVIDIA's GPUDirect software tool. For Tesla software information and developer kits, please visit the NVIDIA website at http://www.nvidia.com/object/tesla_software.html.

1.4.1 Tesla M-class

The Tesla M-class GPU module is a parallel computing processor for high performance computing (HPC). Based upon the Fermi architecture, M-class modules feature up to 665 gigaflops of double precision performance and one teraflop of single precision performance. Tesla M-class modules are the first to utilize ECC memory that provides data reliability required in demanding environments. Some key features of the M-class GPU module include:

- Up to 665 Gigaflops peak double precision floating point performance
- Up to 1221 Gigaflops peak single precision floating point performance
- Up to 512 CUDA cores
- GDDR5 memory up to 6 GigaBytes
- ECC memory error protection
- Integration of the GPU subsystem with the motherboard's monitoring and management through IPMI

The NVIDIA Tesla M-class includes:

- Tesla M2090
- Tesla M2075
- Tesla M2070
- Tesla M2050

Your specific Tesla M-class GPU module should be specified at time of order. Please contact Themis customer support for more details on NVIDIA's Tesla, and the right M-class GPU module for your HPC application.

1.5 Special Features

1.5.1 Recovery from AC Power Loss

The BIOS setup can be configured to allow the system, whenever AC power is lost,

- to remain off (in which case, the power switch must be activated by the user) or
- return to a power-on state automatically when power is restored.

The system default is "**`Last State`**".

1.6 PC Health Monitoring

The following sections describe the PC health monitoring features of the X8DTG-DF. All have an onboard System Hardware Monitor chip that supports PC health monitoring. An onboard voltage monitor will scan these onboard voltages continuously: CPU1 Vcore, CPU2 Vcore, +5Vin, +12Vcc, (V), V P1 DIMM, V P2 DIMM, +3.3Vcc (V), and Battery Voltage. Once a voltage becomes unstable, a warning is given or an error message is sent to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor. Users can adjust system monitoring thresholds by accessing Supermicro's Super Doctor III.

1.6.1 Fan Status Monitor with Firmware Control

The RES-NT1-1U has eight (8) 38-mm chassis cooling fans. The PC health-monitor utility can be used to check the RPM status of cooling fans. The onboard CPU and chassis fans are controlled by Thermal Management via BIOS (under Hardware Monitoring in the Advanced Setting.

1.6.2 Environmental Temperature Control

The thermal-control sensor monitors CPU temperature in real time and will activate the thermal fan when CPU temperature exceeds a user-defined threshold. Overheat circuitry operates independently from the CPU. Once it detects that the CPU temper-

ature is too high, it will automatically turn on the thermal fan control to prevent any overheat damage to the CPU. The onboard chassis thermal circuitry can monitor the overall system temperature and alert users when the chassis temperature is too high

Caution: To avoid possible system overheating, please be sure to provide adequate airflow to your system and clear any debris from the chassis.

1.6.3 System Resource Alert

Available only through Supero Doctor III in the Windows OS environment or Supero Doctor II in Linux, this feature is used to notify the user of certain system events. For example, you can configure Supero Doctor to provide you with warnings when the system temperature, CPU temperature, voltages, and fan speeds go beyond a pre-defined range.

1.7 ACPI Features

Advanced Configuration and Power Interface (ACPI) defines a flexible and abstract hardware interface that provides a standard method of integrating power management features throughout the system. This includes the hardware, the operating system, and the application software. As a result, the system can automatically turn peripherals (CD-ROMs, NICs, storage drives, and printers, for example) on or off. This includes any consumer devices that may be connected to the system.

In addition to providing operating-system power management, ACPI offers a generic system event mechanism for Plug and Play and an operating-system-independent interface for configuration control. Plug-and-Play BIOS data structures are leveraged, while the implementation is processor-architecture-independent and compatible with Windows XP/Windows 2003/Windows 2008/Windows Vista/Windows 7 operating systems.

1.7.1 Slow Blinking LED for Suspend-State Indicator

When the CPU enters a suspend state, the `Power` LED will start blinking to indicate that the CPU is in suspend mode. Pressing any key on the keyboard will awaken the

CPU, at which time the power LED will stop blinking and remain on.

1.7.2 Main Switch Override Mechanism

When an ATX power supply is used, the power button can function as a system suspend button to make the system enter a SoftOff state. The monitor will be suspended and the hard drive will spin down. Pressing the power button again will cause the whole system to wake-up. During the SoftOff state, the ATX power supply provides power to keep the required circuitry in the system "alive." In case the system malfunctions and you want to turn off the power, just press and hold the power button for 4 seconds. This option can be set in the Power section of the BIOS setup routine.

1.8 Overview of Winbond WPCM450 Controller

The Winbond WPCM450 Controller is a Baseboard management Controller (BMC) that supports the 2D/VGA-compatible Graphics Core with the PCI interface, Virtual media, and keyboard/Video/Mouse Redirection (KVMR) modules.

The WPCM450 interfaces with the host system via a PCI interface to communicate with the Graphics core. It supports USB 2.0 and 1.1 for remote keyboard/mouse/virtual media emulation. It also provides LPC interface to control Super I/O functions. The WPCM450 is connected to the network via n external Ethernet PHY module.

The WPCM450 communicates with onboard components via six SMBus interfaces, fan control, and Platform Environment Control Interface (PECI) buses.

Note: For more information on IPMI configuration, please refer to the Embedded IPMI User's Guide posted on www.supermicro.com.

1.9 Specifications

1.9.1 General

Table 1-5 lists general specifications for the RES-NT1-1U.

Table 1-5. RES-NT1-1U General Specifications

Parameter	Description
Dimensions	• 1.75” (1RU) high • 17.06” (433.3 mm) wide (19” rack-mountable) • 20” (508 mm) deep
Weight	• 22 pounds (9.98 kg); includes 1 SATA storage drive, 2 CPUs, 12 DIMMs, 1 Tesla GPU, and 2 power supplies • Add 8.8 pounds (4 kg) for the shipping container and two AC power cords • The manual and associated shipping paperwork weighs approximately 1 lb (0.5 kg)
19” Rack-Mountable with Slide capability	• Left and right rack-mount tabs attached to chassis • Left and right rack-mount slides are *optional*
Temperature[a] Operating Non-Operating:	• 0° up to 50° C (32° up to 122°F) • –40° to 70° C (–40° to 158° F)
Relative Humidity[a] Operating: Non-Operating:	• 8% to 95% (non-condensing) • 5% to 95% (non-condensing)
Maximum Wet Bulb[a] Operating: Non-Operating:	• 55°C, non-condensing • 70°C, non-condensing
Altitude[a] Operating: Non-Operating	• 0 to 10,000 feet above sea level • 0 to 40,000 feet above sea level

a—Specifications are dependent on configuration as indicated in this manual

1.9.2 Electrical

Table 1-6 lists the electrical specifications for a standard RES system.

Table 1-6. RES Electrical Specifications[a]

Parameter	Description		
	AC (120 volts, 750W)	**DC (48 volts, 750W)**	**DC (28 volts, 500W)**
Input Power (*typical*)	• 420 watts (*typical*)[b]	• 420 watts (*typical*)[a]	• 450 watts (*typical*)[a]
Input Current	• 3.5 amperes @120 Vac	• 13.5 amperes @48 Vdc	• 16 amperes @28 Vdc
Input Frequency	• 47–63 Hertz	*NA*	*NA*
Input Voltage	• 100–265 Vac, internally fused	• 40–72 Vdc, internally fused	• 18–36 Vdc, internally fused
Input VA Rating	• 425 VA	*NA*	*NA*
BTU Rating	• 1447 BTU/hour	• 1447 BTU/hour	• 1447 BTU/hour
Power Factor	• 0.99	*NA*	*NA*
Input Leakage Current	• 3.5 mA	*NA*	*NA*
Plug Type	• IEC	• Y-Type (SVS5-4 or equivalent)	• Y-Type (SVS5-4 or equivalent)

a—All numbers represent a “standard” RES unit, and does not necessarily match a specific system. Please contact Themis support for the exact power usage of your specific system.

b—Does not include plug-in PCI cards.

1.9.2.1 System Power

The RES-NT1-1U operates with two N+1 redundant AC power supplies of 750-watts capacity each that auto-range single-phase AC input from 100 to 265 VAC (47 to 63 Hertz) sources. Filtered and fused (internal) AC is supplied to each power supply from a front-mounted power connection.

Two *optional* N+1 redundant DC power supplies of 750 watts (48 volts) or 500 watts (28 volts) each may be substituted for the AC power supplies (see *Table 1-6*). These supplies should be specified at the time of your order.

1.9.2.2 Output Voltage

The RES-NT1-1U power supply provides output voltages that are split between +3.3V, +5V, +5V_{sb}, +12V, and -12V rails.

1.9.3 Environmental

1.9.3.1 Shock

The RES-NT1-1U is designed to survive an elevated shock environment. All structural components are welded together, enabling the system to survive a maximum 3-axis shock load of 35G at 25-ms duration.

1.9.3.2 Electrostatic Discharge

The RES-NT1-1U is designed to tolerate electrostatic pulses up to 15 kilovolts (KV) with no impact on system operation.

1.9.3.3 Noise Level

The chassis is furnished with eight 38-mm fans. The default fan speed control mode is set to the quietest setting. The fan speed has a factory default setting of "**Workstation Mode**." The fan speed setting can be changed by adjusting the BIOS setting for this feature. Call your Themis representative for additional information regarding fan speeds, and noise levels.

Note: All RES-NT1-1U systems are shipped with BIOS fan speed set to the quietest mode. The factory default fan speed control mode of the RES-NT1-1U is "**Workstation Mode**".

1.10 Packaging and Shipping

The RES-NT1-1U is packaged in a reusable shipping container. Approximate weight of an empty container and two AC power cords is 8.8 pounds (4 kg).

The approximate weight of a RES-NT1-1U (loaded with 1 storage drive, 2 CPUs, 12 DIMMs, and 2 power supplies) is approximately 22 pounds (9.98 kg).

The approximate weight of a manual and associated shipping paperwork is one pound (0.5 kg).

Therefore, both the shipping container and a fully installed RES-NT1-1U including power cords, manual, and associated paperwork, weigh under 32 pounds (14.5 kg).

Caution: **Do not discard the original packaging** in which your system was shipped.

The original packaging was designed specifically to withstand the stress and rigors of today's shipping environment. It will be needed in the event the system must be shipped back to Themis Computer. For re-packing instructions, refer to Appendix D, "Repackaging Instructions"

1.10.1 Accessory Kit

Each RES-NT1-1U is packaged with an Accessory Kit, consisting of the following items:

A. Two AC Power Cords

B. One Power Supply Locking Bracket

When you unpack the RES-NT1-1U, please verify that all of these items are included. If any of these items are missing or not as pictured, please call Themis Technical Support at 510-252-0870, or send an email to support@themis.com.

To learn how to secure the AC power cords, refer to Section 2.3.1, "Plugging in the AC Power Cords," on page 2-17.

1.10.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-NT1-1U for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and can be ordered at the time of purchase. To learn how to install rack-mount slides, refer to Appendix B, "Rack-Mount Slide Installation"

1.10.3 Approximate RES Weight

Table *Table 1-7* below lists the approximate weights of typical RES systems.

Table 1-7. Approximate Weights[a] of the RES Series

Model	Weight (Approximate)	CPU Sockets	Depth	Description
RES-12XR3	19.5 lbs (8.9 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-12XR3-S	17 lbs (7.7 kg)	2	17”	
RES-11XR3	16.5 lbs (7.5 kg)	1	17”	
RES-22XR3	25 lbs (11.4 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-22XR3-S	23 lbs (10.4kg)	2	17”	
RES-22XR3/FIO	25.3 lbs (11.5kg)	2	16”	
RES-21XR3	22.5 lbs (10.2 kg)	1	17”	
RES-32XR3	28.5 lbs (12.9 kg)	2	20”	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-32XR3-S	26.5 lbs (12 kg)	2	17”	
RES-32XR3/FIO	29 lbs (13.2 kg)	2	16”	
RES-31XR3	26 lbs (11.8 kg)	1	17”	
RES-12XR3-Rear I/O	17 lbs (7.71kg)	2	15”	Includes: ● All CPU sockets filled ● All storage drive bays filled ● 2 power supplies
RES-22XR3/FIO	21 lbs (9.53kg)	2	13.6”	
RES-32XR3/FIO	25 lbs (11.33kg)	2	13.6”	
RES-NT1-1U	22 lbs (9.98kg)	2	20”	Includes: ● All CPU sockets filled ● 12 DIMMs ● 1 Storage Drive ● 1 Tesla M-class GPU module

a—These are “typical” weights for a RES system. Please contact Themis for the exact weight of your configured system.

Installation Section

Chapter 2

Installation and Operation

This chapter describes:

- The memory modules, storage drive, PCI card, 38-mm-fans, power supplies, and lithium battery.
- Rack-mount brackets and slides
- How to turn the RES-NT1-1U on and off

2.1 Installation Procedures

Caution: Use industry-standard ESD grounding techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. **Handle all IC cards by the front panel or edges only.**

For more information on the system **storage drive**, **fans**, or **power supplies**, skip the next section and proceed directly to page 2-10, page 2-13, or page 2-14, respectively. Replacement of motherboard components requires removal of the protective cover which is to be done by factory authorized personnel only (see “Remove Protective Top Cover” on page 2-2).

2.1.1 Remove Protective Top Cover

To access a motherboard component, open the RES-NT1-1U as follows:

1. Loosen the two captive Phillips screws holding the protective top access cover to the rear of the RES-NT1-1U chassis (see **A**, *Figure 2-1*).
2. Both the front and sides of the cover have flat hooks or tabs underneath that fit under slots on the chassis top edges (see **B**, *Figure 2-1*). Remove the cover by sliding it toward the rear until it is free of these chassis slots.
3. Store the cover in a safe place until it is replaced.

Rear View
A Loosen the 2 captive access-cover screws...
Chassis slot
Left-side top edge
Chassis slot
B ... and slide the top cover toward the rear until the top hooks and tabs clear all chassis slots

Figure 2-1. Remove the RES-NT1-1U Protective Access Cover

4. Proceed to the appropriate section for **memory modules** (page 2-3), **PCI card** (page 2-7), or **lithium battery** (page 2-9).

2.1.2 Memory Modules

The RES-NT1-1U supports memory according to *Table 2-1*.

Table 2-1. RES-NT1-1U Memory Capacity

Motherboard	Memory Parameters				
	Capacity	DDR3 Registered ECC	Speed (MHz)	Number of DIMMS	Pins per DIMM
X8DTG-DF	192 GB	Yes	1333/1066/800	12	240

Caution: Exercise extreme caution when installing or removing Memory Modules to prevent any possible damage. The OS will not boot unless DIMM slot P1-DIMM 1A is populated and meets the minimum capacity for proper operation.

Table 2-2. RES-NT1-1U Optimal Memory Population (CPU1 Installed)

DIMMs	Branch 0		Branch 1		Branch 2	
3 DIMMs	P1 DIMM1A		P1 DIMM2A		P1 DIMM3A	
6 DIMMs	P1 DIMM1A	P1 DIMM1B	P1 DIMM2A	P1 DIMM2B	P1 DIMM3A	P1 DIMM3B

Table 2-3. RES-NT1-1U Optimal Memory Population (CPU2 Installed)

DIMMs	Branch 0		Branch 1		Branch 2	
3 DIMMs	P2 DIMM1A		P2 DIMM2A		P2 DIMM3A	
6 DIMMs	P2 DIMM1A	P2 DIMM1B	P2 DIMM2A	P2 DIMM2B	P2 DIMM3A	P2 DIMM3B

Table 2-4. RES-NT1-1U Optimal Memory Population (CPU1/CPU2 Installed)

DIMMs	CPU 1						CPU 2					
	Branch 0		Branch 1		Branch 2		Branch 0		Branch 1		Branch 2	
6 DIMMs	1A		2A		3A		1A		2A		3A	
12 DIMMs	1A	1B	2A	2B	3A	3B	1A	1B	2A	2B	3A	3B

When installing memory, follow these rules for best memory performance:

- It is strongly recommended that you ***do not mix memory modules*** of different speeds, sizes, and vendors.

2.1.2.1 Installation

The following procedure explains how to install the DDR3 Memory Modules.

This is to serve as an informational section only, and is not intended for use on your RES-NT1-1U. The DIMM slots are located under the airflow diverter. Removing the airflow diverter will destroy the TIM (Thermal Interface Material) placed between the Tesla card and the airflow diverter. All repairs and changes must be done at the factory, or will otherwise void the warranty. Please contact Themis for assistance.

Caution: Removing the airflow diverter will damage the TIM (Thermal Interface Material) and void the warranty. Please contact Themis for assistance.

1. Loosen and remove the screws securing the air-flow deflector to the RES-NT1-1U chassis (see *Figure 2-2*)
2. Remove the air-flow deflector from the system, which will expose the memory module slots (see *Figure 2-3*).
3. If a module is already seated in the slot you have selected for installation, remove it by gently pressing down and outward on the latches at both ends of the slot (see *Figure 2-4* on page 2-7), then pulling the old module directly up from the slot until it is free of the connector.
4. Before inserting a new memory module into the vacant slot, make sure that the two latches are pulled outward away from the center of the slot.

   With the latches in the outward position, gently insert the new module vertically into its slot and press firmly downward until it snaps into place.

Note: Make sure the memory module has the proper orientation by aligning the alignment notch at the bottom edge with its counterpart ridge at the bottom of the slot.

5. When the memory module replacements are completed, replace the air flow diverter and secure it with the screws previously removed in Step 1).

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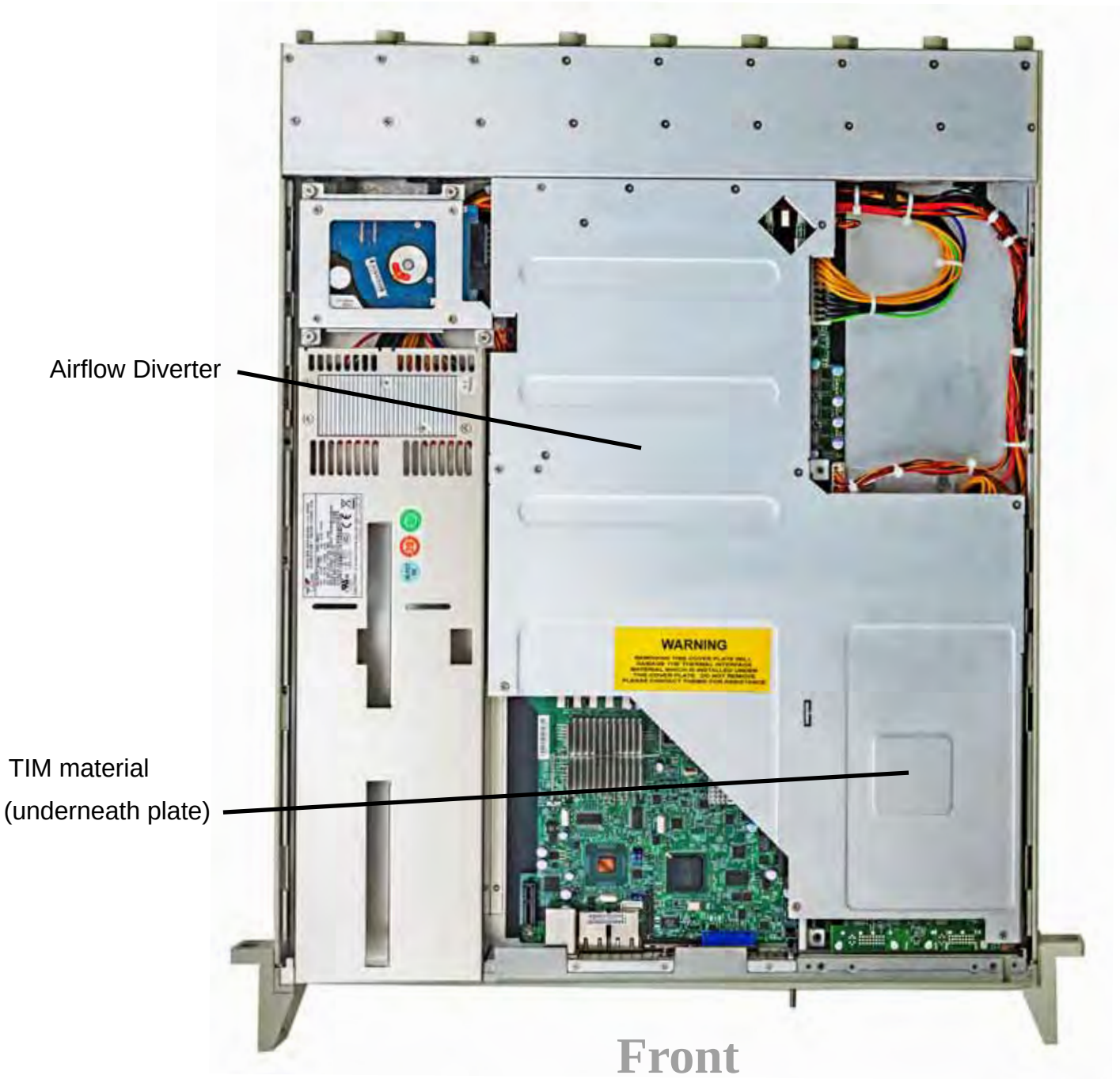

Figure 2-2. Airflow Diverter

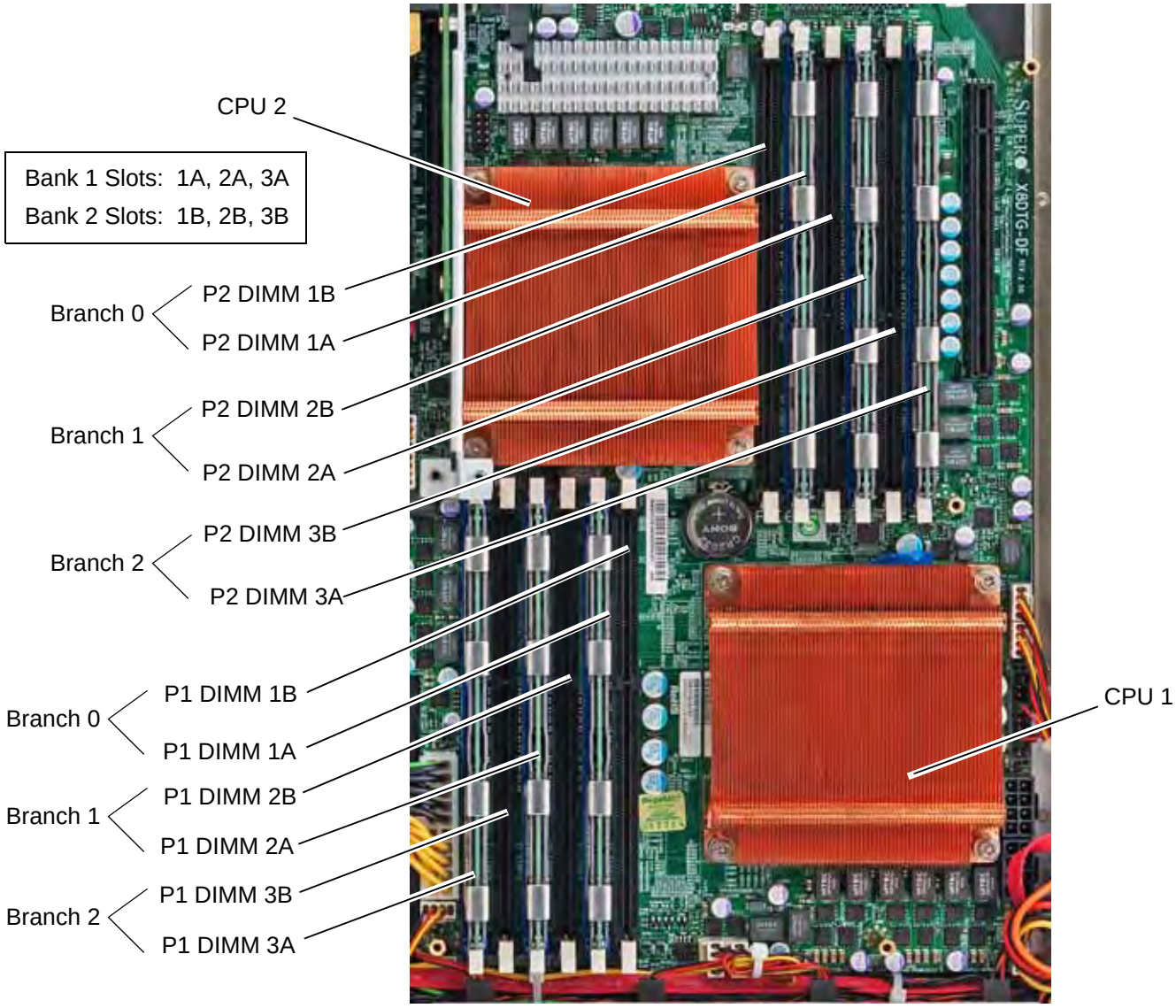

Figure 2-3. Memory Module Slot Locations (X8DTG-DF Motherboard)

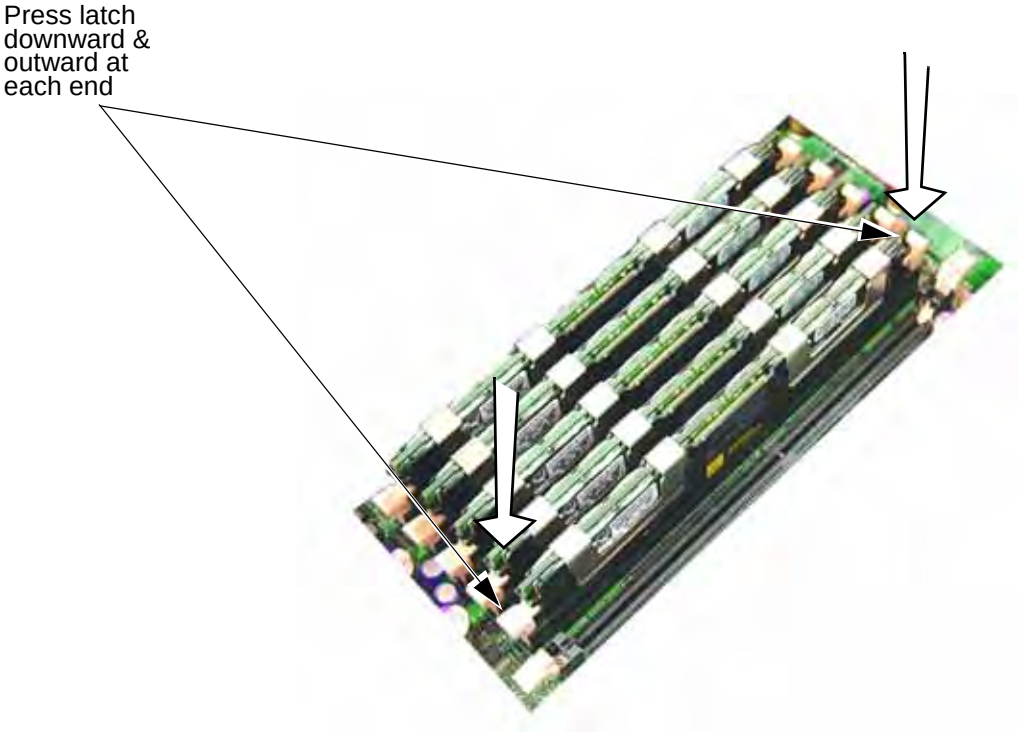

Figure 2-4. Memory Module Removal

2.1.3 PCI Card

Because of the unique design of the X8DTG-DF motherboard and chassis configuration, an optional low profile, half-height PCI card on RES-NT1-1U must be installed horizontally through the top right PCI slot (when facing the front of the system) on the PCI Riser Card (see *Figure 2-5* on page 2-8).

Note: The RES-NT1-1U chassis configuration limits the use of an optional PCI add-on card to one that is of low profile, and half-height.

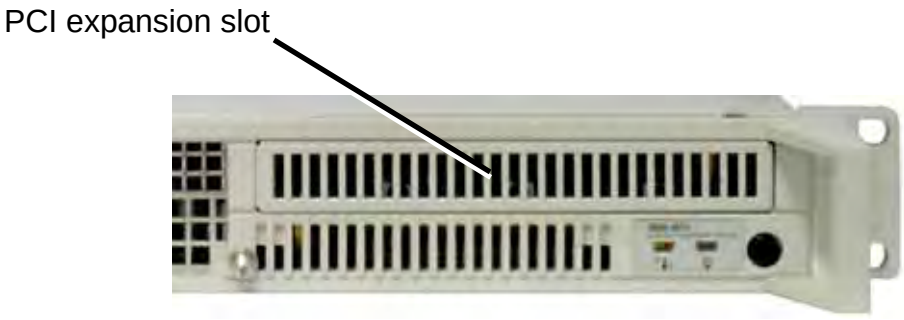

Figure 2-5. Horizontal I/O slot

2.1.3.1 Installing Cards

This section is to serve for informational purposes only. Removing the airflow diverter to access the PCI slots will damage the TIM (Thermal Interface Material) located between the airflow diverter and the Tesla card and void the warranty.

Caution: Removing the airflow diverter will damage the TIM (Thermal Interface Material) and void the warranty. Please contact Themis for assistance.

1. Locate the empty slot within which a card will be installed and remove the blank I/O faceplate corresponding to the slot (see *Figure 2-5*).
2. Carefully install the PCI card into the appropriate slot, securing the I/O faceplate to the I/O panel—if permitted. Secure the side edge of the card according to the following instructions:

   PCI Expansion Slot—Use threaded standoffs to secure the card installed in the PCI expansion slot to the motherboard. Remove the standoff screws, install the PCI card into the slot, and secure the PCI card with the standoff screws.

Figure 2-6. PCI Card Retainer Clip

PCI Retainer Clip—After installing the PCI expansion card, install a PCI Retainer Clip—two if necessary—onto the edge of the PCI card (see.*Figure 2-6*.)

3. Attach any internal I/O cables to the installed PCI cards, and carefully fold and tuck any exposed ribbon cables into the cabinet.

4. If you have no further installations to perform, replace the airflow diverter and close the RES-NT1-1U chassis by refastening the top cover removed in Section 2.1.1, “Remove Protective Top Cover,” on page 2-2.

2.1.4 Lithium Battery (CR2032)

2.1.4.1 Removing the Lithium Battery

This section is to serve for informational purposes only. Removing the airflow diverter to access the lithium battery will damage the TIM (Thermal Interface Material) located between the airflow diverter and the Tesla card, and void the warranty.

Caution: Removing the airflow diverter will damage the TIM (Thermal Interface Material) and void the warranty. Please contact Themis for assistance.

Perform the following steps to remove the lithium battery:

1. Make sure the system is powered off (see “Operation” on page 2-17).

2. Use the cutaway view of *Figure 1-4* on page 1-5 as an indication of where the battery is located on the motherboard.

Locate the lithium battery socket and squeeze the latch (see **A**, *Figure 2-7*) together until the battery lifts out of its socket.

3. Remove the old battery and replace with a new battery (see next section).

A To release, squeeze battery latch together... **B** ... and remove battery from socket

Figure 2-7. The RES-NT1-1U Lithium Battery and Socket

Note: The battery location is dependent on motherboard. See *Figure 1-4* on page 1-5 for the location of the lithium battery.

2.1.4.2 Installing a Lithium Battery

Perform the following steps to insert a new lithium battery:

1. Tilt the replacement lithium battery (CR2032) into the empty socket so that it is angled under the battery latch (see **B**, *Figure 2-7*).
2. Carefully press down on the battery until it clicks firmly into place.

2.1.5 SATA Storage Drive

The RES-NT1-1U has one factory installed SATA storage drive which is to serve as a boot drive for the operating system.

Note: Since RES-NT1-1U has only one storage drive, it should **not** be considered hot-swappable as it is the boot drive for the system, and is running the operating system.

Consult your operating system manual for specific details.

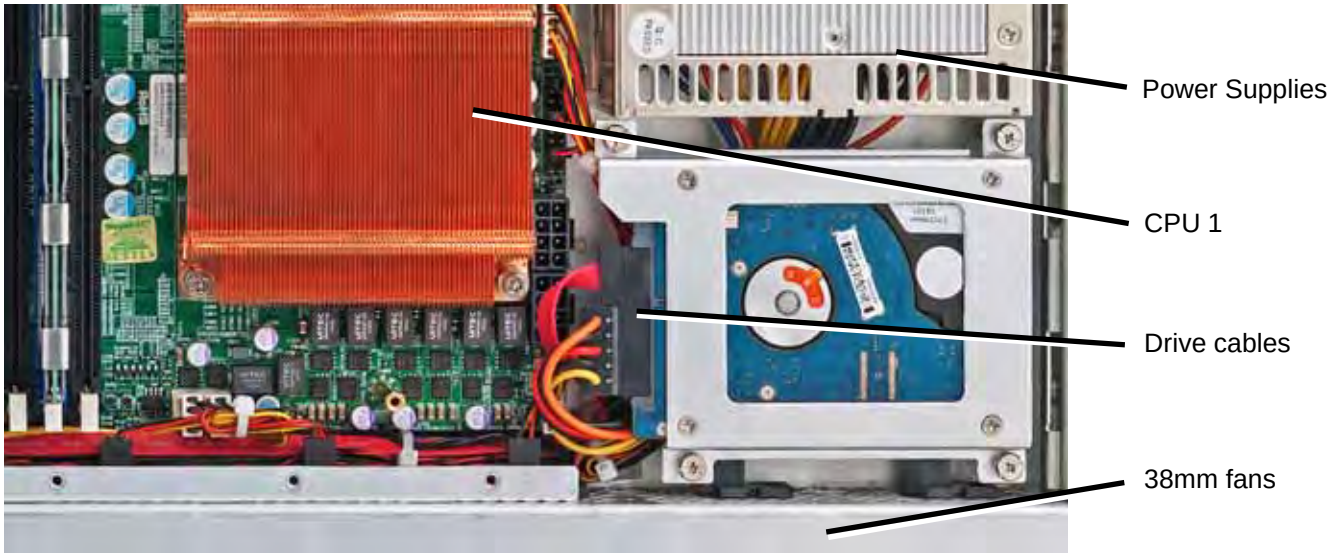

Figure 2-8. Locating the RES-NT1-1U Storage Drive

2.1.5.1 Storage Drive Removal

Perform the following steps to remove and install a storage drive:

1. Make sure an announcement has been sent out to all users that the system will be powered down. When clear, power down the system (see "Turning the System Off" on page 2-18)
2. Locate the drive to be removed.
3. Unplug all cables connected to the SATA storage drive (see *Figure 2-8*).
4. Unscrew the four outer screws holding the storage drive tray to the chassis (see *Figure 2-9* on page 2-12).
5. Unscrew the four storage drive screws holding the drive in the tray (see *Figure 2-9*.

Caution: When unscrewing the storage drive from the tray, hold it at the bottom to prevent it from falling and damaging the drive.

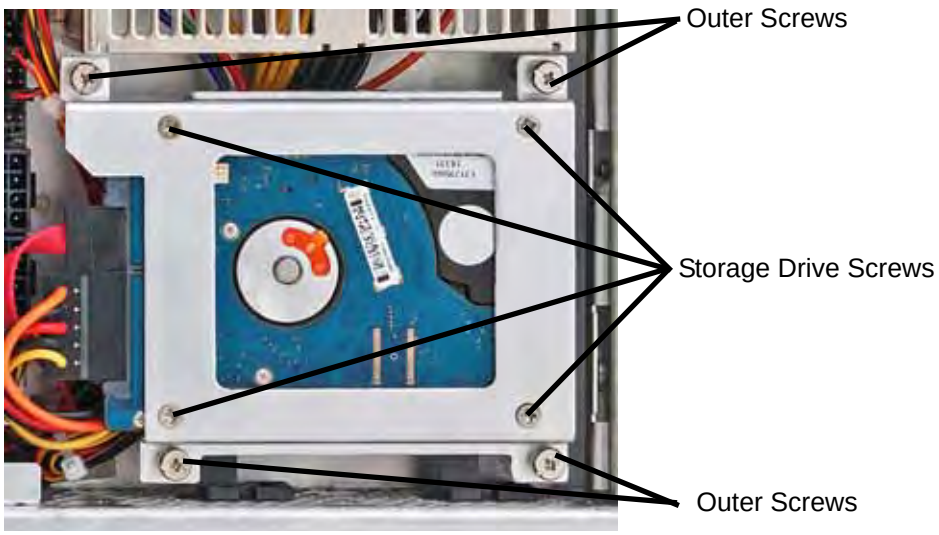

Figure 2-9. RES-NT1-1U Storage Drive Removal

2.1.5.2 Storage Drive Installation

To install a storage drive,

1. Properly orient the new drive and insert it into the drive tray.
2. Replace the four storage drive screws, securing the storage drive to the drive tray.
3. Replace the four outer screws, securing the drive assembly to the chassis.
4. When the drive is fully secured to the chassis, replace all cables to the SATA storage drive

Caution: To prevent damage to you system, it is highly recommended that storage drive installation be done at the factory. Please contact Themis for assistance.

2.1.6 Hot-Swappable 38-mm Fans

The RES-NT1-1U contains eight (8) high-speed 38-mm fans, each of which can be "hot-swapped" in the field in the event of a failure.

Note: Since RES-NT1-1U fans are "hot-swappable", it is not necessary to turn off system power in order to remove and replace a fan. However, since the fans are on the rear of the system unit, it may be necessary to pull out the unit from the rack, which may affect the decision whether or not to turn off system power.

2.1.6.1 Removing and Installing a 38-mm Fan

Perform the following steps to remove and install an 38-mm fan: On the rear of the chassis, locate the two captive thumb screws securing each fan. (see *Figure 2-10*). Loosen the thumbs screws, freeing the fan to be pulled to the rear.

1. When the fan is removed, its 4-wire connector will automatically be disconnected from the chassis. Insert the replacement fan carefully into the empty fan slot until it is flush with the other fans. The 4-wire connector will automatically engage its counterpart connector successfully.

Figure 2-10. RES-NT1-1U Hot-Swappable 38-mm Fans

2.1.7 Power Supply

Each load-sharing (N+1 redundant) power supply can be hot-swapped while the system is still on and operational.

2.1.7.1 Removing a Power Supply

Perform the following steps to remove a power supply:

1. Remove any cable straps and loosen the two captive Phillips screws holding the power supply locking bracket to the chassis (see **A**, *Figure 2-11*). Place the locking bracket in a safe place.
2. Put the right index finger on the power supply extraction handle and the right thumb on the left side of the power supply locking lever. (Some power supplies require the locking lever to be pulled to the left to unlock.)
3. Squeeze the locking lever toward the extraction handle and firmly pull the power supply from the chassis (see **B**, *Figure 2-11*).

Caution: When pulling the power supply from the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

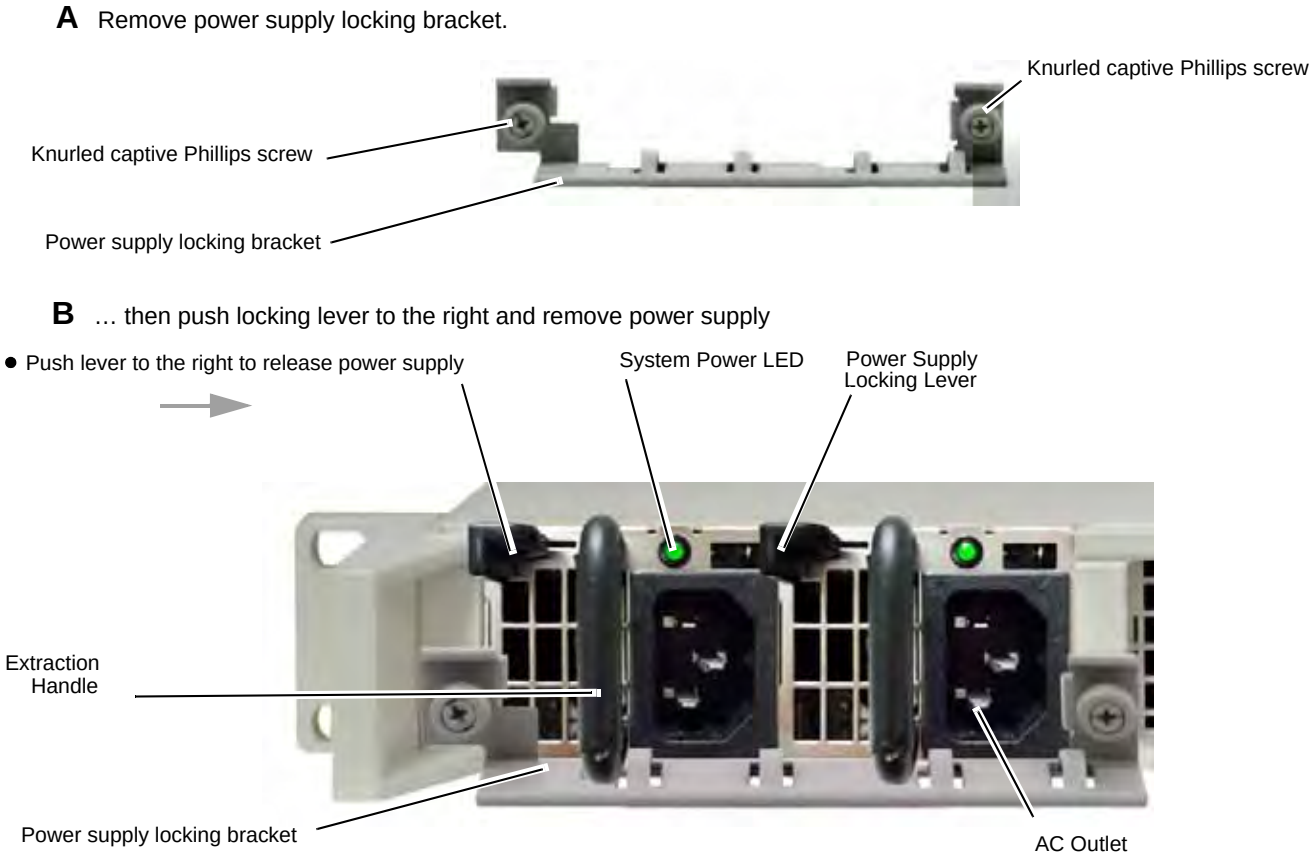
A Remove power supply locking bracket.
Knurled captive Phillips screw
Knurled captive Phillips screw
Power supply locking bracket
B … then push locking lever to the right and remove power supply
Push lever to the right to release power supply
System Power LED
Power Supply Locking Lever
Extraction Handle
Power supply locking bracket
AC Outlet

Figure 2-11. RES-NT1-1U Power Supply Locking Mechanism

2.1.7.2 Installing a Power Supply

Perform the following steps to install a power supply:

1. Insert the replacement power supply into an empty slot with the power LED at the top (see *Figure 2-11*).
2. Push the power supply carefully into its slot until it is firmly seated (a click will be heard when the locking lever is securely fastened to the chassis).
3. Replace the power supply locking bracket and tighten the two captive screws to hold it to the chassis to secure both power supplies. (see *Figure 2-11*)

2.2 Rack Mounts

2.2.1 Mounting Brackets

The rack-mount brackets (flanges) are used to secure the chassis to the 19” rack (see *Figure 2-12*). Handles are used to pull the RES-NT1-1U from the rack when rack-mount slides have been installed on the sides of the chassis (see following section).

Figure 2-12. Right Rack-Mount Bracket

2.2.2 Rack-Mount Slides (Optional)

Rack-Mount Slides (P/N 110854-005) can be mounted on each side of the RES-NT1-1U for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and should be ordered at the time your system is purchased.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Caution: Any screws used to mount a slide to a RES-NT1-1U chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

2.3 Operation

2.3.1 Plugging in the AC Power Cords

Before powering on the RES-NT1-1U, plug in the AC power cords as follows:

1. On the front of the RES-NT1-1U, plug an AC power cord (shipped with unit) into the AC power socket on each power supply (see *Figure 2-13*).

Figure 2-13. AC Power Supplies

2.3.2 Turning the System On

1. Plug the AC power cord from each of the RES-NT1-1U power supplies into a "live" AC outlet.

   The LED on each power supply will turn on when AC power is enabled.

2. On the front of the RES-NT1-1U push the system power on/off button (see *Figure 2-14*). This will cause the system POWER LED to light (green).

Figure 2-14. System Power Button and LED on the RES-NT1-1U Front

2.3.3 Getting Started

2.3.3.1 Configuration

1. Make the storage drive is securely installed (see “SATA Storage Drive” on page 2-10).
2. Make sure that a graphics card is installed in a PCI-*Express* slot; see *Figure 2-5*, page 2-8) and attach a monitor to the appropriate connector.

Note: The X8DTG-DF motherboard has onboard graphics capability. Unless desired, a PCI-E add-on graphics card is not required.

3. Connect a keyboard and mouse to the USB connectors on the front I/O panel of the RES-NT1-1U (see *Figure 1-5* on page 1-6).
4. Turn the system on (see previous section).

2.3.3.2 Linux Installation

The subject of installing the Linux operating system onto the RES-NT1-1U is detailed in Appendix C, “Red Hat Enterprise Linux 5 Installation”.

2.3.4 Turning the System Off

Caution: Before turning your system off, make sure to save all open files, properly close applications, and broadcast a warning to all users on any active networks.

1. To turn the RES-NT1-1U power off, press and hold the system power on/off button (see *Figure 2-14*, page 2-17) for at least four (4) seconds. This will shut down the system and turn off the `POWER` LED.

   As an alternative, a modern operating system (Windows 9x or newer and Linux, for example) can turn off the system after a graceful OS software shutdown.

Installation Section

Chapter 3

BIOS Setup Utility

3.1 Introduction

This chapter describes the AMI BIOS Setup Utility for the RES-NT1-1U motherboard X8DTG-DF. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.

3.1.1 Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

Note: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it

.

Note: The AMI BIOS has default text messages built in. Supermicro retains the option to include, omit, or change any of these text messages.

The AMI BIOS Setup Utility uses a key-based navigation system called “hot keys”. Most of the AMI BIOS setup utility “hot keys” can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

Note: Options printed in **Bold** are default settings.

3.1.2 How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

3.1.3 Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

3.2 Main Setup

When you first enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.

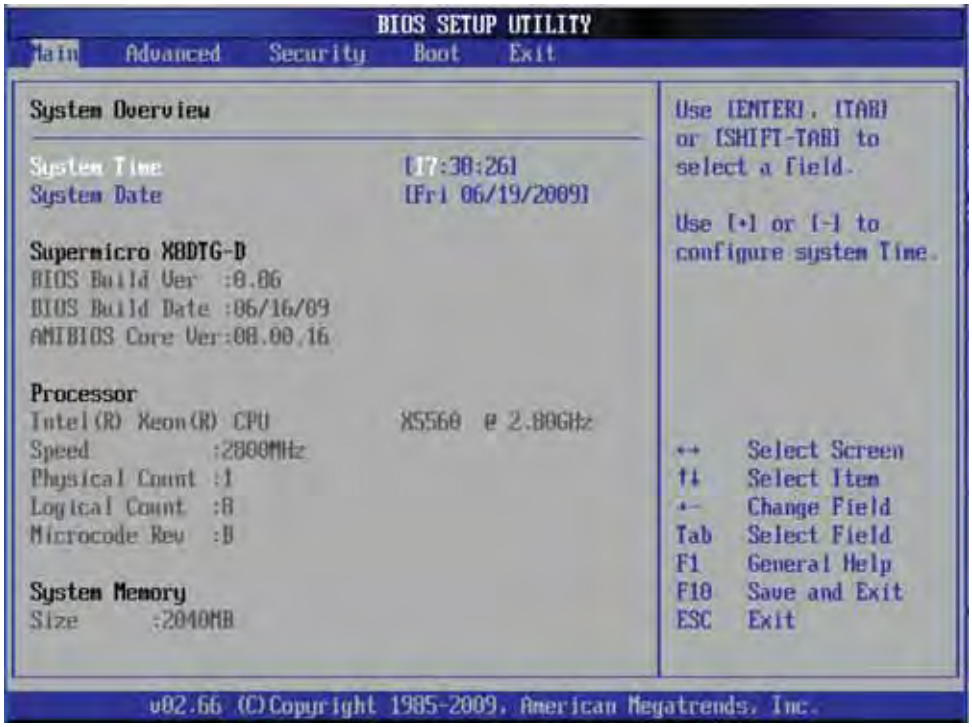

Figure 3-1. Main BIOS Setup Screen

3.2.1 System Overview

The following BIOS information will be displayed:

3.2.1.1 System Time/System Date

Use this option to change the system time and date. Highlight *System Time* or *System Date* using the arrow keys. Enter new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date must be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.).

3.2.1.2 Supermicro X8DTG-DF

- BIOS Build Version: This item displays the BIOS revision used in your system.
- BIOS Build Date: This item displays the date when this BIOS was completed.
- AMI BIOS Core Version: This item displays the revision number of the AMI BIOS Core upon which your BIOS was built.

3.2.1.3 Processor

The AMI BIOS will automatically display the status of the processor used in your system:

- CPU Type: This item displays the type of CPU used in the motherboard.
- Speed: This item displays the speed of the CPU detected by the BIOS.
- Physical Count: This item displays the number of processors installed in your system as detected by the BIOS.
- Logical Count: This item displays the number of CPU Cores installed in your system as detected by the BIOS.

3.2.1.4 System Memory

This displays the size of memory available in the system:

- Size: This item displays the memory size detected by the BIOS.

3.3 Advanced Setup Configurations

Use the arrow keys to select Boot Setup and hit <Enter> to access the submenu items:

Figure 3-2. Advanced Settings Screen

3.3.1 BOOT Features

3.3.1.1 Quick Boot

If Enabled, this option will skip certain tests during POST to reduce the time needed for system boot. The options are **Enabled** (default) and Disabled.

3.3.1.2 Quiet Boot

This option allows the bootup screen options to be modified between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** (default) and Disabled.

3.3.1.3 AddOn ROM Display Mode

This sets the display mode for the Option ROM. Select Keep Current to use the current AddOn ROM Display setting. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** (default) and Keep Current.

3.3.1.4 Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On** (default).

3.3.1.5 Wait For 'F1' If Error

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled** (default).

3.3.1.6 Hit 'Del' Message Display

This feature displays “Press DEL to run Setup” during POST. The options are **Enabled** (default) and Disabled.

3.3.1.7 Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will “capture” Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are Enabled and **Disabled** (default).

3.3.2 Power Configuration

3.3.2.1 Power Button Function

If set to Instant_Off, the system will power off immediately as soon as the user hits the power button. If set to 4_Second_Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant_Off** (default) and 4_Second_Override.

3.3.2.2 Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power-On, Power-Off and **Last State** (default).

3.3.2.3 Watch Dog Timer

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled** (default)**.**

3.3.3 Processor and Clock Options

This submenu allows the user to configure the Processor and Clock settings.

3.3.3.1 Ratio CMOS Setting

This option allows the user to set the ratio between the CPU Core Clock and the FSB Frequency. The default setting depends on what type of CPU is installed. For example, the default setting is **[21]**. Press “+” or “-” on your keyboard to change this value.

Note: If an invalid ratio is entered, the AMI BIOS will restore the setting to the previous state. The Ratio CMOS settings differ, depending on the type of CPU installed in the system.

3.3.3.2 C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E significantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a “Halt State.” The options are Disabled and **Enabled** (default).

3.3.3.3 Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled** (default).

3.3.3.4 Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU prefetches the cache line for 64 bytes if this option is set to Disabled. The CPU prefetches both cache lines for 128 bytes as comprised if **Enabled** (default).

3.3.3.5 Intel® Virtualization Technology (Available when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are **Enabled** (default) and Disabled.

Note: If there is any change to this setting, you will need to power off and restart the system for the change to take effect. Please refer to Intel's website for detailed information.

3.3.3.6 Execute-Disable Bit Capability (Available when supported by the OS and the CPU)

Set to Enabled to enable the Execute Disable Bit support which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled** (default). (Refer to Intel and Microsoft Web Sites for more information.)

3.3.3.7 Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to use the Simultaneous Multi-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled** (default)**.**

3.3.3.8 Active Processor Cores

Set to Enabled to use a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are **All** (default)**,** 1 and 2.

3.3.3.9 Intel® EIST™ Technology

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. Please refer to Intel's web site for detailed information. The options are Disable (Disable GV3) and **Enable (Enable GV3)** (default).

3.3.3.10 Intel® TurboMode Technology

Select Enabled to allow the processor cores to run faster than normal under special circumstances to improve performance. The options are **Enabled** (default) and Disabled.

3.3.3.11 Intel® C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3 or C4 state. The options are Disabled and **Enabled** (default).

3.3.3.12 C State package Limit Setting (Available when C-State support is enabled)

If this option is set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto** (default), C1, C3, C6, C7.

3.3.3.13 C1 Auto Demotion

When this item is set to enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled** (default)

3.3.3.14 C3 Auto Demotion

When this item is set to enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled** (default).

3.3.3.15 Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** (default) and Enabled.

3.3.4 Advanced Chipset Control

The items included in the Advanced Settings submenu are listed below:

CPU Bridge Configuration

3.3.4.1 QPI Links Speed

This feature selects QPI's data transfer speed. The options are Slow-mode, and **Full Speed** (default).

3.3.4.2 QPI Frequency

This selects the desired QPI frequency. The options are **Auto** (default), 4.800 GT, 5.866GT, 6.400 GT.

3.3.4.3 QPI L0s and L1

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboard. The options are Disabled and **Enabled** (default).

3.3.4.4 Memory Frequency

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto** (default), Force DDR-800, Force DDR-1066, Force DDR-1333.

3.3.4.5 Memory Mode

The options are **Independent** (default), Channel Mirror, Lockstep, and Sparing.

- Independent - All DIMMs are available to the operating system.
- Channel Mirror - The motherboard maintains two identical copies of all data in memory for redundancy.
- Lockstep - The motherboard uses two areas of memory to run the same set of operations in parallel.
- Sparing - A preset threshold of correctable errors is used to trigger fail-over. The spare memory is put online and used as active memory in place of the failed memory.

3.3.4.6 Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are Enabled and **Disabled** (default).

3.3.4.7 Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are Enabled and **Disabled** (default).

3.3.4.8 NUMA Support

Select Enabled to use the feature of Non-Uniform Memory Access to improve CPU performance. The options are **Enabled** (default) and Disabled.

3.3.4.9 Memory ECC Error Threshold

This feature allows the user to set the correctable memory ECC error limit for AMI BIOS to handle it. The Default setting is **255**.

3.3.4.10 Throttling - Closed Loop/Throttling - Open Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are **Disabled** (default) and Enabled. If Enabled, the following items will appear:

Hysteresis Temperature (Closed Loop Only)

Temperature Hysteresis is the temperature lag (in degrees Celsius) after the set DIMM temperature threshold is reached before Closed Loop Throttling begins. The options are Disabled, **1.5°C** (default), 3.0°C, and 6.0°C.

Guardband Temperature (Closed Loop Only)

Use this feature to change the DIMM temperature threshold. Each step is in 0.5°C increments. the default is **[006]**.

Inlet Temperature

This is the temperature detected at the chassis inlet. Each step is in 0.5°C increments. The default is **[070]**. Press “+” or “-” on your keyboard to change this value.

Temperature Rise

This is the temperature rise to the DIMM thermal zone. Each step is in 0.5°C increments. The default is **[020]**. Press "+" or "-" on your keyboard to change this value.

Air Flow

This is the air flow speed to the DIMM modules. Each step is on mm/sec. The default is **[1500]**. Press "+" or "-" on your keyboard to change this value.

Altitude

This feature defines how many meters above or below sea level the system is located. The options are **Sea Level or Below**, 1~300,301~600, 601~900, 901~1200, 1201~1500, 1501~1800, 1801~2100, 2101~2400, 2401~2700, 2701~3000.

DIMM Pitch

This is the physical space between each DIMM module. Each step is in 1/1000 of an inch. the default setting is **[400]**. Press "+" or "-" on your keyboard to change this value.

Serial Debug Message Level

This feature allows the user to set the level of debug message to be displayed. the default setting is **None**.

Margin Ranks

This feature allows the user to set the margin for each rank after configuring Rx DQ, TX DQ, Rx Vref, and Tx Vref settings. The options are Enabled, and **Disabled** (default).

Northbridge Configuration

This feature allows the user to configure the settings for the Intel North bridge chip.

3.3.4.11 Crystal Beach/DMA (Direct Memory Access)

This feature works in conjunction with the Intel I/O AT (Acceleration Technology) to accelerate the performance of TOE devices. When this feature is set to Enabled, it will enhance overall system performance by providing direct memory access for data transferring. The options are Enabled and **Disabled** (default).

3.3.4.12 Coarse-Grained Clock Gating

Coarse Grained Clock Gating (CGCG) is a power-saving technique used on a Intel IO Hub (IOH). When this feature is set to Disabled, all clocks on the die of the IOH chip will be disabled except for the Intel management engine (Intel ME) subsystem. Any non ME clocks left running will detect events to restore the clock to the whole die. When this feature is set to Enabled, all clocks on the die will be enabled to maximize power efficiency. The options are **Enabled** (default) and Disabled.

3.3.4.13 Intel VT-d

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled** (default).

3.3.4.14 IOH PCIE Port1 Link Select

This feature allows the user to configure the link setting for PCI-Express Port 1 that is connected to the Intel IOH chip. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, and **x16** (default).

3.3.4.15 IOH PCI-E Max Payload Size

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128B; while others, with a payload size of 256B which inhibits the coalesce feature. Please refer to your add-on card user guide for the desired setting. The options are 256B and **128B** (default).

Southbridge Configuration

This feature allows the user to configure the settings for the Intel ICH Southbridge chipset.

3.3.4.16 USB Functions

Select Enabled to use onboard USB connections. The Options are Disabled and **Enabled** (default).

3.3.4.17 Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard. The settings are Disabled, **Enabled** (default), and Auto.

3.3.4.18 USB 2.0 Controller

Select Enabled to activate the onboard USB 2.0 controller. The options are **Enabled** (default) and Disabled (The manufacturer's default setting cannot be changed by the user).

3.3.4.19 USB 2.0 Controller Mode

This setting allows you to select the USB 2.0 Controller mode. The options are **Hi-Speed (480 Mbps**) (default) and Full Speed (12 Mbps).

3.3.4.20 BIOS EHCI Hand-Off

Select Enabled to enable BIOS Enhanced Host Controller Interface support to provide a workaround solution for an operating system that does not have EHCI Hand-Off support. When enabled, the EHCI Interface will be changed from the BIOS-controlled to the OS-controlled. The options are Disabled and **Enabled** (default).

IDE/SATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE devices and displays the following items:

3.3.4.21 SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, **Compatible** (default), and Enhanced.

Configure SATA#1 as

This feature allows the user to select the drive type for SATA#1. Select RAID (Intel) to enable Intel's SATA RAID firmware to configure Intel's SATA RAID settings. Select RAID (Adaptec) to enable Adaptec's SATA RAID firmware to configure Adaptec's SATA RAID settings. Select AHCI to enable SATA Advanced Host Interface.

Caution: Take caution when using this function. This feature is for advanced programmers only.

The options are **IDE** (default)**,** RAID (Intel), RAID (Adaptec) and AHCI.

3.3.4.22 SATA#2 Configuration

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced** (default).

3.3.4.23 Primary IDE Master / Slave, Secondary IDE Master / Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of Primary IDE Master/Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are:

Type

Select the type of device connected to the slot. Select Auto to allow the BIOS to automatically select the device type as it is detected on the slot. Select CD/DVD to configure the slot for CD/DVD devices. Select ARMD to use this slot for removable devices. The options are Not Installed, **Auto** (default), CD/DVD and ARMD.

LBA / Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a storage drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto** (default).

Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** (default) and Disabled.

PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto** (default), 0, 1, 2, 3, and 4.

Select Auto to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE storage drive support cannot be determined.

Select 0–4 to allow the AMI BIOS to use PIO mode 0–4. It has a data transfer rate of 3.3MB/s–16.6MB/s. See Below.

Table 3-1. PIO Mode Select Options

Option Selected	PIO Mode	Max. Transfer Rate
0	PIO Mode 0	3.3 MB/s
1	PIO Mode 1	5.2 MB/s
2	PIO Mode 2	8.3 MB/s
3	PIO Mode 3	11.1 MB/s
4	PIO Mode 4	32-Bits Bandwidth

DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE storage drive support cannot be determined. The options are Auto, SWDMAn, MWDMAn, and UDMAn. See below for DMA Mode Select Options.

Table 3-2. DMA Mode Select Options

Option Selected	DMA Mode	Max. Transfer Rate
SWDMA 0	Single-Word DMA 0	2.1 MB/s
SWDMA 1	Single-Word DMA 1	4.2 MB/s
SWDMA 2	Single-Word DMA 2	8.3 MB/s
MWDMA 0	Multi-Word DMA 0	4.2 MB/s
MWDMA 1	Multi-Word DMA 1	13.3 MB/s
MWDMA 2	Multi-Word DMA 2	16.6 MB/s
UDMA 0	Ultra DMA 0	16.6 MB/s
UDMA 1	Ultra DMA 1	25 MB/s
UDMA 2	Ultra DMA 2	33.3 MB/s
UDMA 3	Ultra DMA 3	66.6 MB/s
UDMA 4	Ultra DMA 4	100 MB/s
UDMA 5	Ultra DMA 5	133 MB/s
UDMA 6	Ultra DMA 6	133 MB/s

S.M.A.R.T. For Storage drives

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect storage drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support storage drive disk. The options are Disabled, Enabled, and **Auto** (default).

32 Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** (default) and Disabled.

3.3.4.24 IDE Detect Timeout (sec)

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and **35** (default).

3.3.5 PCI/PnP Configuration

3.3.5.1 Clear NVRAM

This feature clears the NVRAM during system boot. The options are **No** (default) and Yes.

3.3.5.2 Plug & Play OS

Selecting Yes allows the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** (default) to allow the AMI BIOS to configure all devices in the system.

3.3.5.3 PCI Latency Timer

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64** (default), 96, 128, 160, 192, 224 and 248.

3.3.5.4 PCI IDE Bus Master

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled** (default)**.**

3.3.5.5 Load Onboard LAN 1 Option ROM/Load Onboard LAN 2 Option ROM

Select Enabled to enable onboard LAN1/LAN2 Option ROM support which will allow you to boot your system using a network interface. The options are Enabled and **Disabled** (default).

3.3.6 Super IO Device Configuration

3.3.6.1 Serial Port1 Address/ Serial Port2 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are Disabled, **3F8/IRQ4** (default), 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port2 are Disabled, **2F8/IRQ3** (default), 3E8/IRQ4, and 2E8/IRQ3.

3.3.7 Remote Access Configuration

3.3.7.1 Remote Access

This allows the user to enable the Remote Access feature. The options are Disabled and **Enabled** (default). If Remote Access is set to Enabled, the following items will display:

Serial Port Number

This feature allows the user decide which serial port to be used for Console Redirection. The options are **COM 1** (default), COM 2**.**

Base Address, IRQ

This item displays the base address and IRQ of the serial port used for Console Redirection.

Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1** (default); 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

Flow Control

This feature allows the user to set the flow control for Console Redirection. The options are **None** (default), Hardware, and Software.

Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST. (Note: This setting may not be supported by some operating systems.) Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always** (default).

Terminal Type

This feature allows the user to select the target terminal type for Console Redirection. The options are **ANSI** (default), VT100, and VT-UTF8.

VT-UTF8 Combo Key Support

Select Enabled to use VT-UTF8 Combo as the keyboard type to send commands from a remote console. The options are **Enabled** (default) and Disabled.

Sredir Memory Display Delay

This feature defines the length of time in seconds to display memory information. The options are **No Delay** (default)**,** Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

3.3.8 Hardware Health Configuration

This feature allows the user to monitor system health and review the status of each item as displayed.

3.3.8.1 CPU Overheat Alarm

This option allows the user to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.

Caution: **1.** Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed.
2. To avoid possible system overheating, please be sure to provide adequate airflow to your system.

The options are:

- The Early Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.
- **The Default Alarm** (default): Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5°C above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

3.3.8.2 CPU Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

CPU1 Temperature/CPU2 Temperature

The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This 'Temperature Threshold' or 'Temperature Tolerance' has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (i.e., by increasing fan speed, triggering the Overheat Alarm, etc). Since CPUs can have different 'Temperature Tolerances', the installed CPU can now send information to the motherboard what its 'Temperature Tolerance' is, and not the other way around. This results in better CPU thermal management.

Supermicro has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU's temperature status, rather than by just simply seeing a temperature reading (i.e., 25°C). The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

- **Low –** This level is considered as the 'normal' operating state. The CPU temperature is well below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control). User intervention: No action required.
- **Medium –** The processor is running warmer. This is a 'precautionary' level

and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings. User intervention: No action is required. However, consider checking the fans and the chassis ventilation for blockage.

- **High –** The processor is running hot. This is a 'caution' level since the CPU's 'Temperature Tolerance' has been reached (or has been exceeded) and may activate an overheat alarm and Overheat LED.

Caution: If the system buzzer and Overheat LED activate, take immediate action to check the system fans for proper operation, and that all vents are open and free of dirt and debris. Failure to take action can result in permanent damage to your system.

Note: **1**. The system may shut down if it continues for a long period to prevent damage to the CPU. **2.** The information provided above is for your reference only. For more information on thermal management, please refer to Intel's Web site atwww.Intel.com.

3.3.8.3 System Temperature

The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

3.3.8.4 Fan1—Fan 8 Reading

This feature displays the fan speed readings from fan interfaces Fan1 through Fan8. (Fan7 is CPU1 Fan and Fan8 is CPU2 Fan.)

3.3.8.5 System Fan Monitor

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. Select Server if your system is used as a Server. Select "Disabled, (Full Speed @12V)" to disable the fan speed control function and allow the onboard fans to constantly run at the full speed (12V). The Options are: 1. Disabled (running @full-speed), 2. Server Mode, and **3. Workstation Mode** (default).

3.3.8.6 Voltage Monitoring

CPU1 Vcore, CPU2 Vcore, +5Vin, 12Vcc (V), V P1 DIMM, V P2 DIMM, 3.3V Vcc (V) and Battery Voltage.

3.3.9 ACPI Configuration

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

3.3.9.1 ACPI Version Features

The options are **ACPI v1.0** (default), ACPI v2.0 and ACPI v3.0. Please refer to ACPI's website for further explanation: http://www.acpi.info/.

3.3.9.2 ACPI APIC Support

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** (default) and Disabled.

3.3.9.3 APIC ACPI SCI IRQ

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled** (default).

3.3.9.4 Headless Mode

This feature is used to enable the system to function without a keyboard, monitor or mouse attached The options are Enabled and **Disabled** (default).

3.3.9.5 High Performance Event Timer

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** (default) and Disabled.

3.3.9.6 General WHEA Configuration

WHEA Support

Select Enabled to enable Windows Hardware Error Architecture (WHEA) support which will provide a common infrastructure for the system to handle hardware errors on Windows platforms to reduce system crashes caused by hardware errors and to improve system recovery and health monitoring. The default setting is **Enabled**.

3.3.10 IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel's website at www.intel.com.

3.3.10.1 Status of BMC

Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

3.3.10.2 IPMI Firmware Revision

This item displays the IPMI Firmware Revision Number currently used in this system.

View BMC System Event Log

This feature displays the BMC System Event Log (SEL). It shows the total number of entries of BMC System Events.

To view an event, select an Entry Number and pressing <Enter> to display the information as shown in the screen.

- SEL Entry Number
- SEL Record ID
- SEL Record Type
- Event
- Timestamp

- Generator ID
- Event Message Format Version
- Event Sensor Type
- Event Sensor Number,
- Event Dir Type
- Event Data.

3.3.10.3 Clear BMC System Event Log

Select OK and press the <Enter> key to clear the BMC system log. Select Cancel to keep the BMC System log. The options are **OK** (default) and Cancel.

Caution: Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address as shown in the following graphics.

3.3.10.4 Channel Number

Enter the channel number for the SET LAN Config command. Press “+” or “-” on your keyboard to change the Channel Number.

3.3.10.5 Channel Number Status

This feature returns the channel status for the Channel Number selected above: “Channel Number is OK” or “Wrong Channel Number”.

3.3.11 IP Address Configuration

This submenu displays the following IP Address Configuration information.

3.3.11.1 Parameter Selector

This item displays the parameter of your IP Address configuration.

3.3.11.2 IP Address Source

Select the source of this machines's IP address. If Static is selected, you will need to know and enter manually the IP address of this machine below. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network it is attached to, and request the next available IP address. The options are **DHCP** (default) and Static.

3.3.11.3 IP Address

This item displays the IP address of this computer. The value of each three-digit number separated by dots should not exceed 255.

3.3.11.4 Current IP Address in BMC

This item displays the current IP address used for your IPMI connection.

MAC Address Configuration

This submenu displays the following MAC Address Configuration information.

3.3.11.5 Parameter Selector

Use this feature to select the parameter of your Mac Address configuration.

3.3.11.6 MAC Address

This item displays the MAC address of this computer. MAC used for your IPMI connection

3.3.11.7 Current MAC Address in BMC

This item displays the current MAC address used for your IPMI connection.

Subnet Mask Configuration

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255.

3.3.11.8 Parameter Selector

Use this feature to select the parameter of your Subnet Masks configuration.

3.3.11.9 Subnet Mask

This item displays the current subnet mask setting for your IPMI connection.

3.3.11.10Current Subnet Mask in the BMC

This item displays the current Subnet Mask used for your IPMI connection.

Gateway Address

Enter the gateway address for this machine. This should be in decimal and in dotted quad form (i.e., 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255 as shown in the screen below.

3.3.11.11Parameter Selector

Use this feature to select the parameter of your Gateway Address settings.

3.3.11.12Gateway Address

The BIOS will automatically enter the Gateway address of this machine; however it may be over-ridden. Gateway addresses are 6 two-digit hexadecimal numbers separated by dots.

3.3.11.13Current Gateway Address in BMC

This item displays the current Gateway address used for your IPMI connection.

3.3.12 DMI Event Log

3.3.12.1 View Event Log

Use this option to view the System Event Log.

3.3.12.2 Mark all events as read

This option marks all events as read. The options are **OK** (default) and Cancel.

3.3.12.3 Clear event log

This option clears the Event Log memory of all messages. The options are **OK** (default) and Cancel.

3.4 Security Settings

The AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

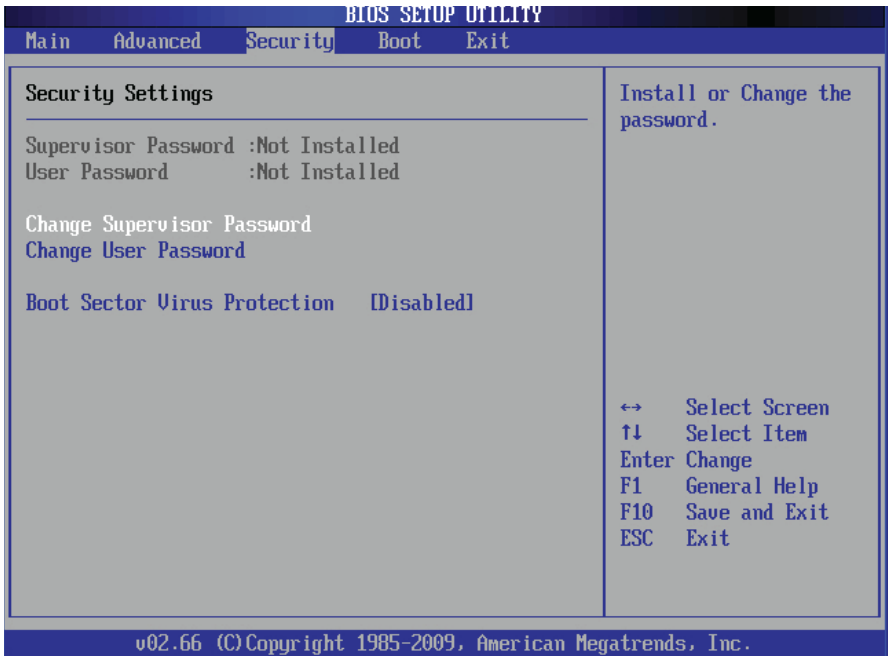

Figure 3-3. Security Settings

3.4.1 Supervisor Password

This item indicates if a Supervisor password has been entered for the system. “Not Installed” means a Supervisor password has not been used.

3.4.2 User Password

This item indicates if a user password has been entered for the system. “Not Installed” means that a user password has not been used.

3.4.3 Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then enter a new Supervisor Password.

3.4.4 User Access Level (Available when Supervisor Password is set as above)

Use this feature to set the user's access level. The options are:

- **Full Access** (default): grants full User read and write access to the Setup Utility,
- View Only: allows access to the Setup Utility, but cannot change the fields,
- Limited: allows only limited fields to be changed such as Date and Time,
- No Access: prevents User access to the Setup Utility.

3.4.5 Change User Password

Select this feature and press <Enter> to access the submenu, and then enter a new User Password.

3.4.6 Clear User Password (Available only if User Password has been set)

This item allows you to clear a user password after it has been entered.

3.4.7 Password Check

This item allows you to check a password after it has been entered. The options are **Setup** (default) and Always.

3.4.8 Boot Sector Virus Protection

When Enabled, the AMI BIOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the storage drive. The options are Enabled and **Disabled** (default).

3.5 Boot Configuration

Use this feature to configure boot settings (see *Figure 3-4*).

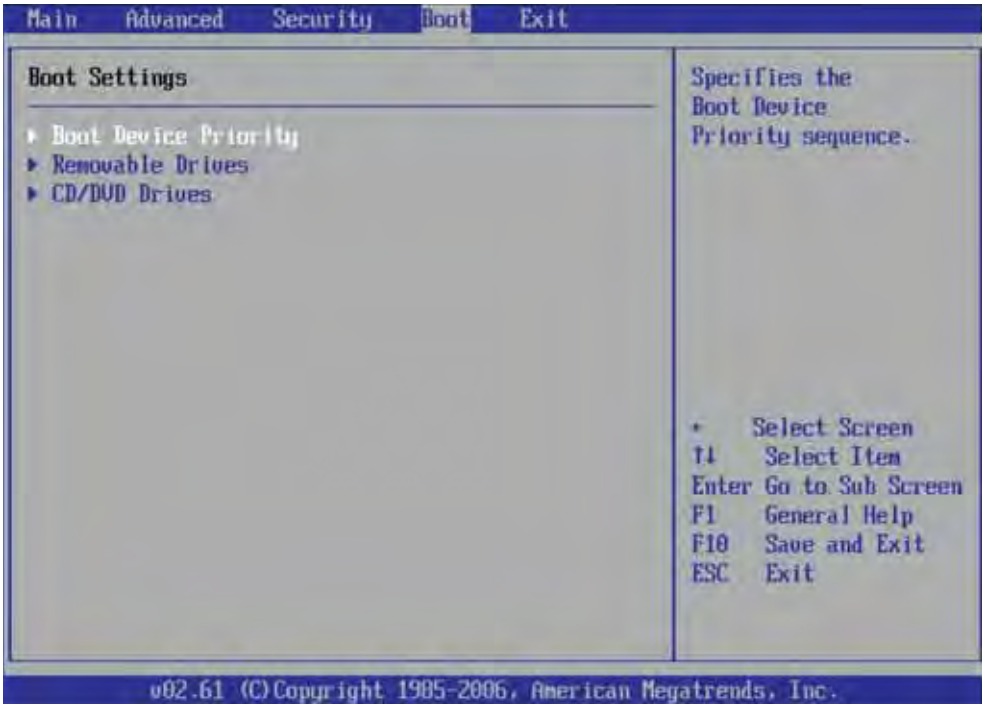

Figure 3-4. Boot Settings

3.5.1 Boot Device Priority

This feature allows the user to specify the sequence of priority for the Boot Device. The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device, and Disabled.

- 1st Boot Device - 1st Floppy Drive
- 2nd Boot Device - [USB: XXXXXXXXX]

3.5.1.1 Storage Drives

This feature allows the user to specify the boot sequence from all available storage drives. The settings are Disabled and a list of all storage drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

3.5.2 Removable Drives

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

- 1st Drive - 1st Floppy Drive
- 2nd Drive - [USB: XXXXXXXXX]

3.5.3 CD/DVD Drives

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

3.6 Exit Options

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.

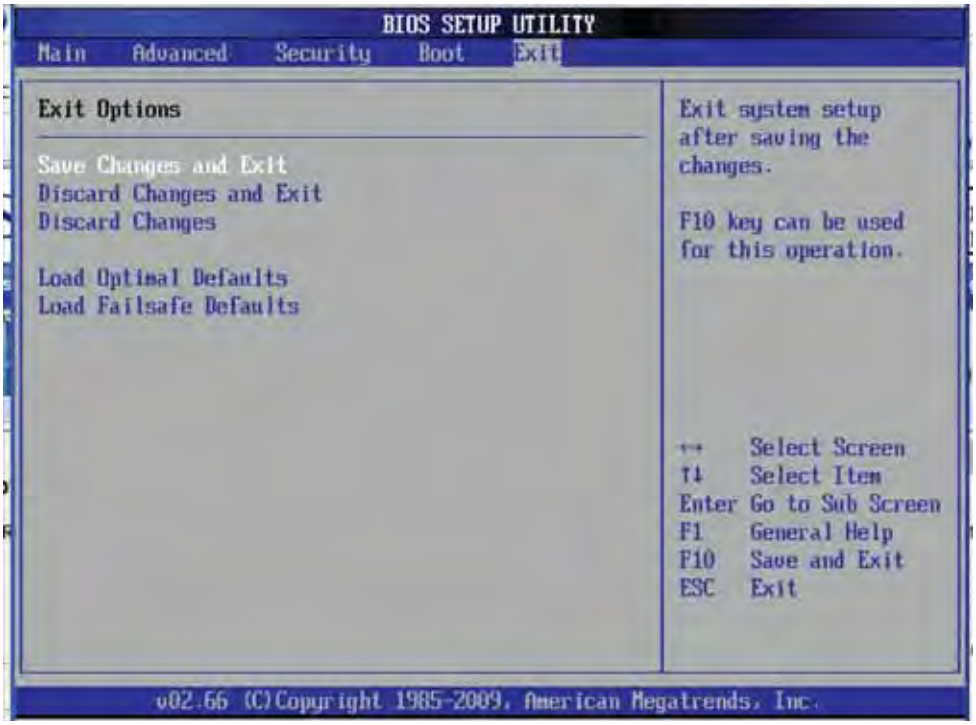

Figure 3-5. Exit Options

3.6.1 Save Changes and Exit

When you have completed the system configuration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

3.6.2 Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

3.6.3 Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

3.6.4 Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

3.6.5 Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

3.7 BIOS Recovery

Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

3.7.1 How to Recover the AMIBIOS Image (the Main BIOS Block)

An AMIBIOS flash chip consists of a boot sector block, and a main BIOS code block (a main BIOS image). The boot sector block contains critical BIOS code, including memory detection and recovery code to be used to flash a new BIOS image if the original BIOS Image is corrupted. When the system is powered on, the boot sector code executes first. Once it is completed, the main BIOS code will continue with system initialization and complete the bootup process.

Note: BIOS Recovery described below is used when the main BIOS block crashes. However, when the BIOS Boot sector crashes, you will need to send the motherboard back to Supermicro for RMA repairs.

3.7.2 Boot Sector Recovery from a USB Device

This feature allows the user to recover a BIOS image using a USB device without additional utilities needed. A user can download the BIOS image into a USB flash device, and name the file “SUPER.ROM” for the recovery process to load the file. A USB flash device such as a USB Flash Drive, a USB CDROM or a USB CDRW device can be used for this purpose:

1. Insert the USB device that contains the new BIOS image (the ROM files) saved in a root directory into your USB drive.
2. While turning the power on, press and hold <Ctrl> and <Home> at the same time until the USB Access LED Indicator comes on. This might take a few seconds.

3. Once the USB drive LED is on, release the <Ctrl> and <Home> keys. AMI-BIOS will issue beep codes to indicate that the BIOS ROM file is being updated.

4. When BIOS flashing is completed, the computer will reboot. Do not interrupt the flashing process until it is completed.

3.7.3 Boot Sector Recovery from an IDE CD-ROM

This process is almost identical to the process of Boot Sector Recovery from a USB device, except that the BIOS image file is loaded from a CD-ROM. Use a CD-R or CD-RW drive to burn a CD with the BIOS image file in it, and name the file "SUPER.ROM" for the recovery process to load the file.

3.7.4 Boot Sector Recovery from a Serial Port ("Serial Flash")

This process, also known as "Serial Flash," allows the user to use a serial port to load a BIOS image for Boot Sector recovery. This feature is usually used for embedded systems that rely on a serial port for remote access and debugging.

Requirements

In order to use Serial Flash for Boot Sector Recovery, you will need to meet the following requirements.

- The "Target system," the system that needs BIOS updates, must have a serial port and "Serial Flash" support embedded in the BIOS image file.
- The "Host system" should also have a serial port and a terminal program that supports XModem Transfer protocol (Hyper Terminal for the Windows operating systems, and minicom for Linux/FreeSBD, etc.).
- A Null_modem serial cable

How to use Serial Flash for Boot Sector Recovery:

1. Connect a Null_modem serial cable between the target system and the host system that runs the terminal program.

2. Make sure that the new BIOS Image file is accessible for the host system.

3. Start the terminal program on the host system and create a new connection.

Use the following communication parameters for the new connection.

- Bits per second: 115200 bits/sec.
- Data Bits: 8
- Parity: None
- Stop Bit: 1
- Flow Control: None

4. When BIOS flashing is completed, the computer will reboot. Do not interrupt the flashing process until it is completed.

```
.....................Press <SpaceBar> to update BIOS.
.......................Confirm update BIOS? (y/n) y
.....................Begin remote BIOS flash? (y/n) y
.............................Starting remote flash.
.........Upload new BIOS file using Xmodem protocol.
```

5. Following the instructions given on the screen to update the BIOS. These instructions are also shown below.

a. At the prompt, press the <SpaceBar> to update the BIOS.

b. When asked to confirm BIOS updating, press <y> to confirm BIOS updates.

c. Press <y> again to begin flashing BIOS remotely.

Note: Be sure to complete Steps a to c above quickly because you have a second or less to do so.

6. Once you've completed the instructions given, a screen will display to indicate that remote flashing is starting and the new BIOS file is being uploaded.

7. To use Hyper Terminal to transfer the XModem protocol by using the “Send File” dialog under the “Transfer” menu, follow the instructions below to complete XModem transfers.

a. Select the “Transfer” menu and enter <Send> (see *Figure 3-6*).

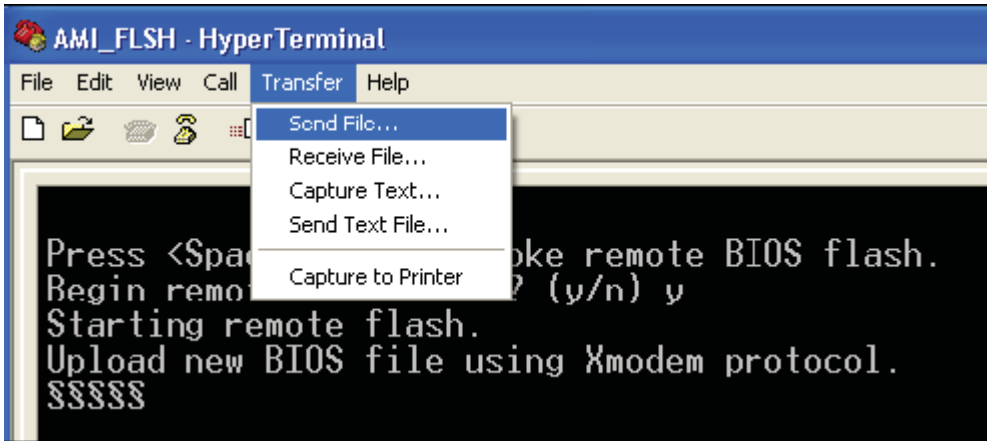

Figure 3-6. AMI_FLSH Hyperterminal

b. Specify the location of the ROM file and select the proper protocol (XModem).

c. Press <Send> to start ROM File extraction. (see *Figure 3-7*)

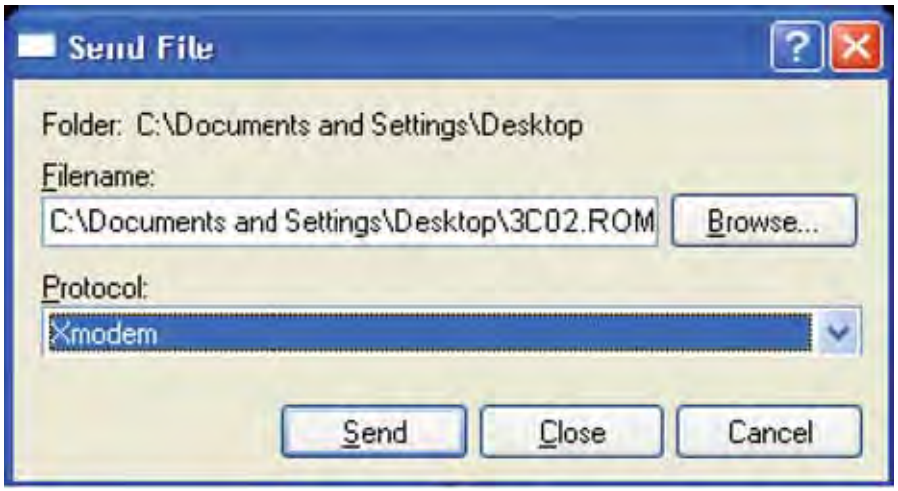

Figure 3-7. ROM File Extraction

d. Once the ROM file extraction is completed, the message: “New BIOS received OK” will display.

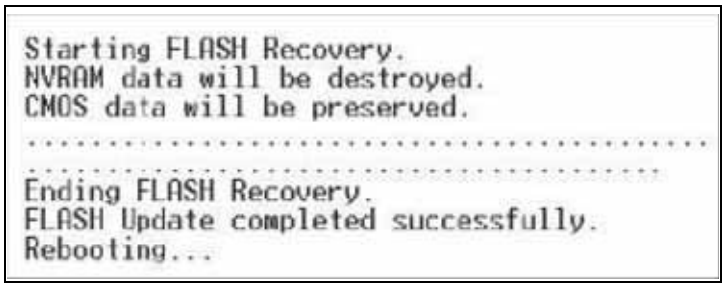

Figure 3-8. FLASH Recovery

8. After the remote BIOS flash is completed, the system will reboot.

Note: AMBIOS Serial Flash will work with any terminal communications program that supports VT-100 and XModem protocols, including protocols designed for GNU/LINUX & BSD operating systems such as minicom. It is recommended that the terminal program be configured to use the “CR/LF” style of line termination.

Appendix A

Connector Pinouts

This appendix provides connector pinouts for all standard user I/O interfaces on the front I/O panel of the RES-NT1-1U.

A.1 USB Ports

RES-NT1-1U supports two USB (Universal Serial Bus) port connectors (see *Figure A-1* for a connector pinout), USB 0 and USB 1, on the front I/O panel. In addition, six USB ports are supported from internal headers: USB 2/3, USB 4/5, USB 6 and USB 7. Pinout descriptions are listed in *Table A-1*.

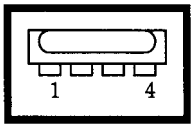

Figure A-1. USB Connector Pinout

Table A-1. USB Connector Pinout Signal Descriptions

Pin	Signal Name	Pin	Signal Name
1	+5V	3	PO+
2	PO–	4	GND

A.2 Serial Ports

The RES-NT1-1U supports one **male** DB9 serial port connector on the front I/O panel (see *Figure A-2*)—TTYA (COM1). Another serial port TTYB (COM 2) is accessed from the motherboard. COM1 pinout signal descriptions are listed in *Table A-2*.

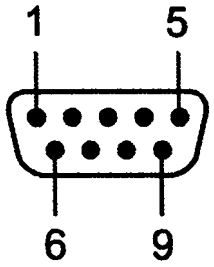

Figure A-2. COM1/COM2 Serial Connector

Table A-2. COM1/COM2 Serial Connector Pinouts

Pin	Signal Name
1	DCD
2	RXD
3	TXD

Pin	Signal Name
4	DTR
5	GND
6	DSR

Pin	Signal Name
7	RTS
8	CTS
9	RI

A.3 Gigabit Ethernet LAN Port

The RES-NT1-1U supports two RJ45 Gigabit Ethernet LAN port connectors (LAN 1 and LAN 2), each with two embedded LEDs (see *Figure A-3*). Pinout signal descriptions are listed in *Table A-3*.

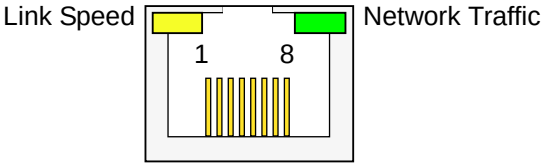

Figure A-3. Ethernet Connector, Type RJ45

Table A-3. RJ45 Ethernet Pinout Signals

Pin	Signal Name		Pin	Signal Name
1	TRD0+		5	TRD2+
2	TRD0-		6	TRD2-
3	TRD1+		7	TRD3+
4	TRD1-		8	TRD3-

- The color of the left LED indicates the LAN connection speed:
  - — Off = 10 MHz
  - — Green = 100 MHz
  - — Amber = 1 GHz
- The right LED, when lit, indicates LAN activity (network traffic).

A.4 IPMI Dedicated LAN Port

The single IPMI dedicated Ethernet LAN port on the RES-NT1-1U front I/O panel has identical pinout and signal descriptions as the LAN 1 and LAN 2 Ethernet ports described in the previous Section A.3, “Gigabit Ethernet LAN Port”.

A.5 VGA Display Port

The RES-NT1-1U supports a single 15-pin (three 5-pin rows) **female** VGA graphics display port connector on the front I/O panel (see *Figure A-4* for a connector pinout). Pinout signal descriptions are listed in *Table A-4*.

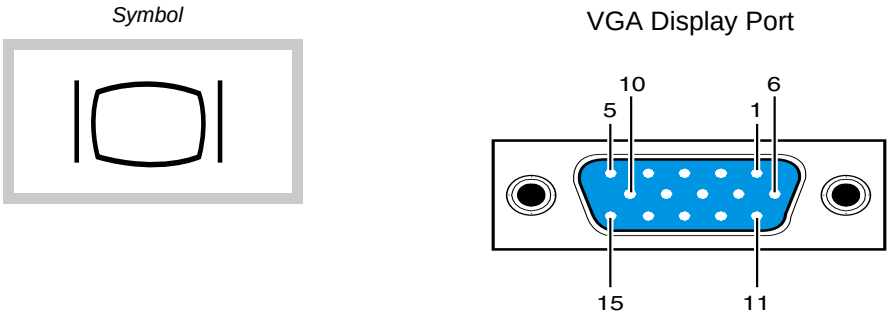

Figure A-4. VGA Connector Pinout

Table A-4. VGA Connector Pinout Signal Descriptions

Pin	Signal	Description
1	RED	Red video
2	GREEN	Green video
3	BLUE	Blue video
4	MS2	Monitor ID bit 2
5	GROUND	Ground (HSync)
6	GROUND	Red return
7	GROUND	Green return
8	GROUND	Blue return
9	NC	Key (no pin)
10	GROUND	Ground (VSync)
11	MS0	Monitor ID bit 0
12	MS1: SDA (DDC Data)	Monitor ID bit 1
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	MS3: SCL (DDC CLK)	Monitor ID bit 3

Appendix B

Rack-Mount Slide Installation

An *optional* set of two rack-mount slides (left side and right side) is available for all NT1 systems, and should be ordered at the time of purchase. The RES-NT1-1U chassis contains 7 threaded screw holes on each side to accommodate #8-32 size screws (included with the rack-mount slide kit); steel slides require four mounting holes, and aluminum slides require three mounting holes (see *Figure B-2*, page B-3).

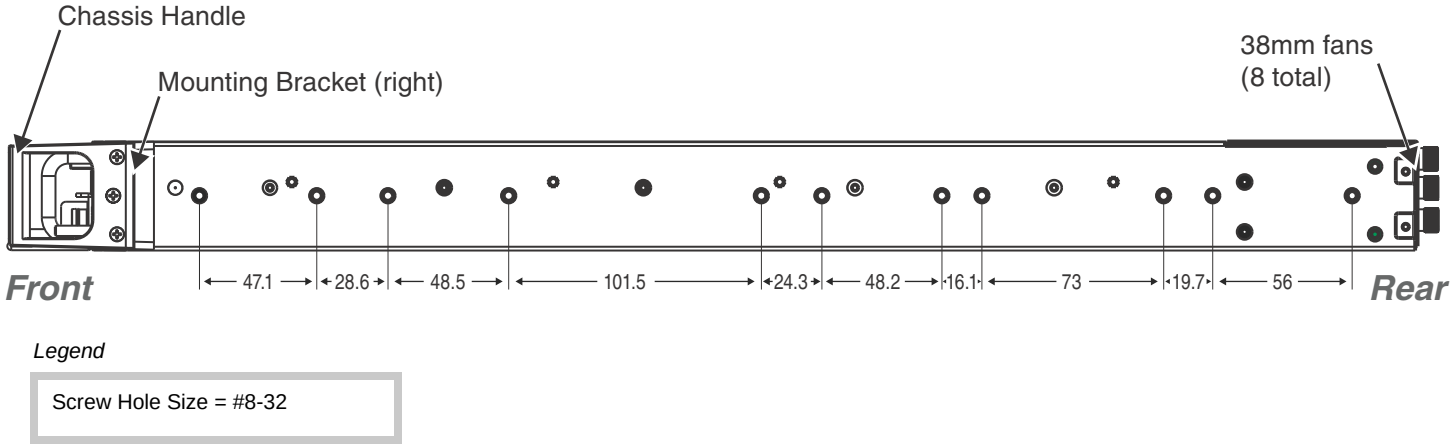

Figure B-1. Screw Locations for Rack-Mount Slides

Dimensions of the screw-hole patterns on the sides of the RES-NT1-1U chassis for installing rack-mount slides are shown in *Figure B-1*.

Caution: Any screws used to mount a slide to a RES-22 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

The rack-mount slide installation kit (#110854-005) includes the following items:

a. Two inside slide sections

b. Two outside slide sections

c. Two front (short) slide brackets

d. Two rear (long) slide brackets

e. Assorted screws, washers, and nuts

Follow these steps to install a steel rack-mount slide to the RES-NT1-1U chassis:

1. Attach the inside slide section (see *Figure B-2* on page B-3) to both sides of the RES-NT1-1U chassis using four #8-32 screws per side.
2. Measure the depth of the 19” equipment rack into which the RES-NT1-1U system will be installed (this can vary from 24” to 30”).
3. Using the depth of the equipment rack, adjust and attach the front and rear slide brackets to the outside slide section using the screws, washers, and nuts provided with the slide kit.
4. With all slide brackets securely attached to both the right and left outside slide sections, install both sections to the inside right and inside left of a 19” rack with two bolts per bracket, making sure there is adequate room for the 1RU height (1.75”) of the RES-NT1-1U system.
5. Carefully insert the RES-NT1-1U system into the 19” rack so that the inside slides on both sides of the chassis travel smoothly into the channels of the outside slide sections. Push the system into the rack until the mounting brackets on the front of the chassis are flush with the front of the rack.
6. Secure the RES-NT1-1U system to the 19” rack with two bolts on each side.

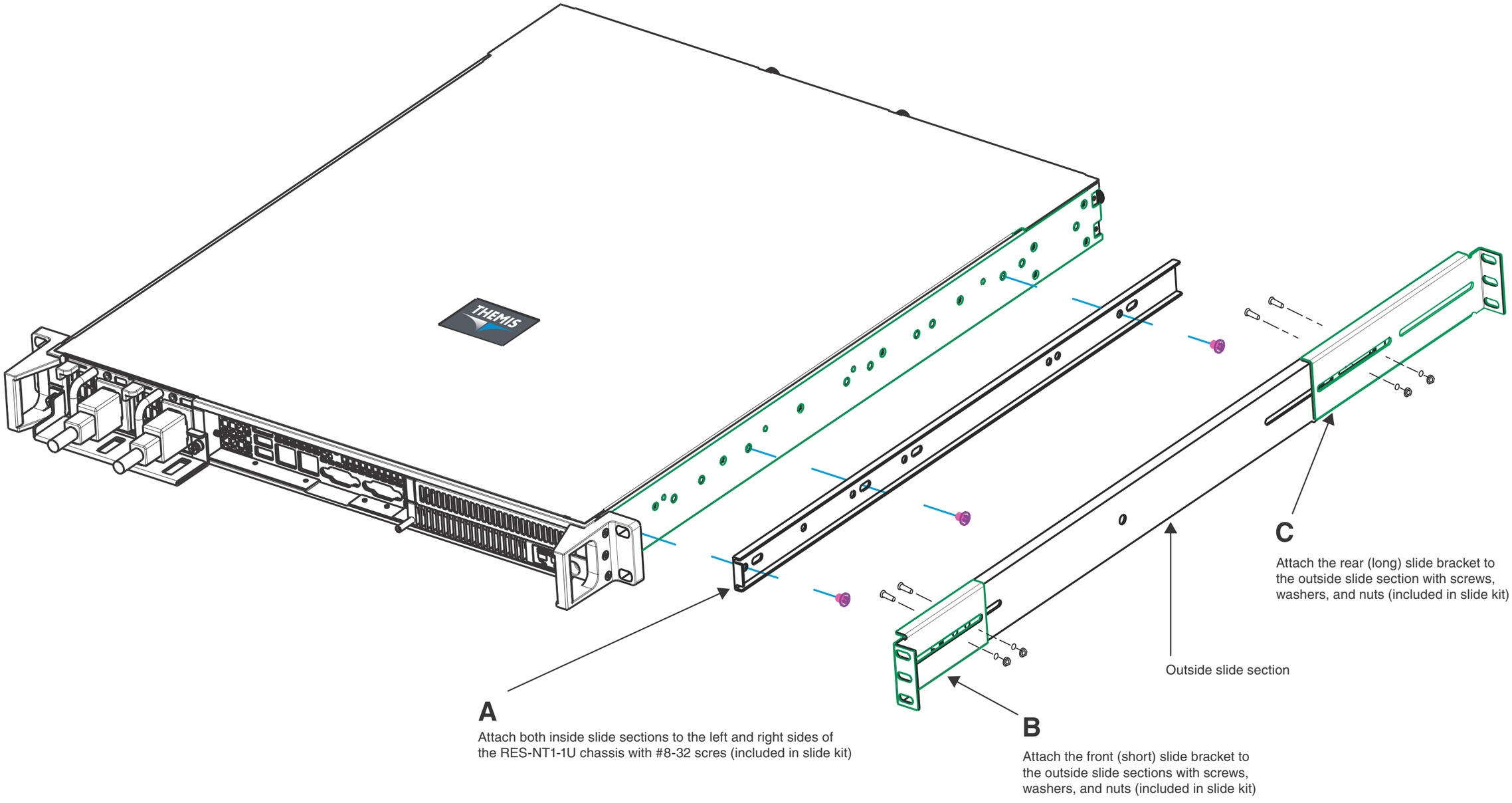
THEMIS
A
Attach both inside slide sections to the left and right sides of the RES-NT1-1U chassis with #8-32 scres (included in slide kit)
B
Attach the front (short) slide bracket to the outside slide sections with screws, washers, and nuts (included in slide kit)
Outside slide section
C
Attach the rear (long) slide bracket to the outside slide section with screws, washers, and nuts (included in slide kit)

Figure B-2. RES-NT1-1U Rack-Mount Slide Installation

Appendix C

Red Hat Enterprise Linux 5 Installation

C.1 Introduction

Welcome to the Red Hat® Enterprise Linux® Installation Guide. This guide contains useful information to assist you during the installation of Red Hat Enterprise Linux via DVD device. From fundamental concepts such as installation preparation to the step-by-step installation procedure.

C.2 Installation

Step 1: Insert the Redhat Enterprise Linux 5 DVD and Power on the system; you will see the first installation screen with a boot prompt, press “ENTER” to begin installation (see *Figure C-1* on page C-2).

RED HAT
ENTERPRISE LINUX 5
- To install or upgrade in graphical mode, press the key.
- To install or upgrade in text mode, type: .
- Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _

Figure C-1. Power On after Linux DVD is Inserted into Drive

Step 2: Press the “tab” key to move focus to the “Skip” key, then press “Enter” key to Continue (see *Figure C-2*).

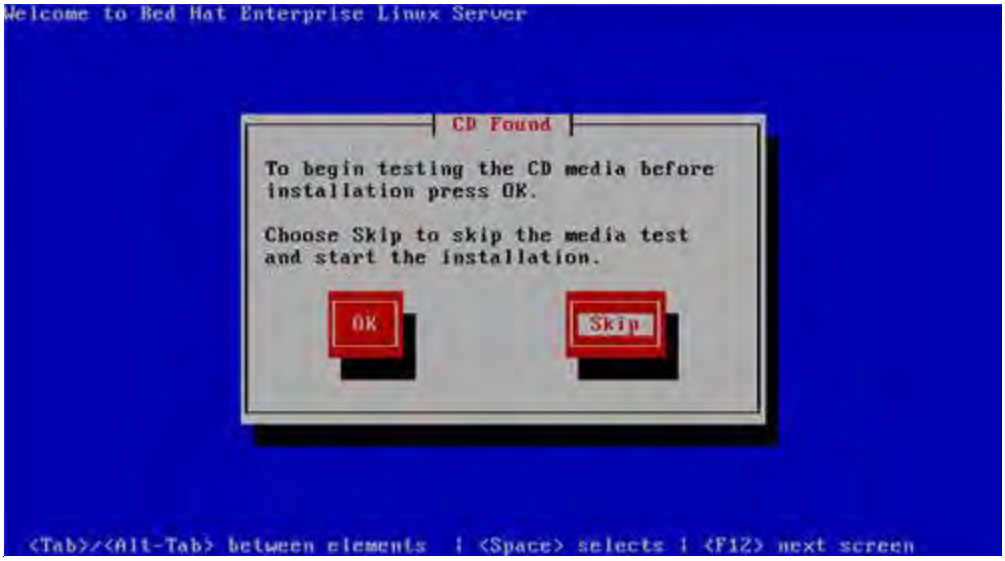
Welcome to Red Hat Enterprise Linux Server
CD Found
To begin testing the CD media before installation press OK.
Choose Skip to skip the media test and start the installation.
OK
Skip
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

Figure C-2. Skip Key

Step 3: Press Enter and you will see the **Welcome** screen. Welcome screen does not prompt you for any input. From this screen you can access the Release Notes for Red Hat Enterprise Linux 5.0.0 by clicking on the Release Notes button (see *Figure C-3*).

Figure C-3. Welcome Screen

Click on the **Next** button to continue.

Step 4: Using your mouse, select a language to use for the installation. The language you select here will become the default language for the operating system once it is installed. Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen (see *Figure C-4* on page C-4).

redhat
Additional Language Support
Select a language to use as the default language. The default language will be the language used on the system once installation is complete. If you choose to install other languages, it is possible to change the default language after the installation.
Red Hat Linux can install and support several languages. To use more than one language on your system, choose specific languages to be installed, or select all languages to have all available languages installed on the system.
Use the Reset button to cancel
Select the default language for the system:
English (USA)
Select additional languages to install on the system:
English (Great Britain)
English (Hong Kong)
English (India)
English (Ireland)
English (New Zealand)
English (Philippines)
English (Singapore)
English (South Africa)
English (USA)
English (Zimbabwe)
Estonian
Faroese (Faroe Islands)
Finnish
French (Belgium)
French (Canada)
French (France)
French (Luxembourg)
Select All
Select Default Only
Reset
Hide Help
Release Notes
Back
Next

Figure C-4. Language Selection

Once you select the appropriate language, click **Next** to continue.

Step 5: Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default (see *Figure C-5* on page C-5).

Figure C-5. Selecting Layout Type

Once you have made your selection, click **Next** to continue.

Step 6: Enter the installation number, if you don't have an installation number; select the Skip Entering Installation Number Radio Button. Click OK, and if you did not enter an installation number, you'll be given a warning. Click Skip to continue (see *Figure C-6* on page C-6).

Figure C-6. Enter Installation Number

Click **Next** to continue.

Step 7: Partitioning allows you to divide your storage drive into isolated sections, where each section behaves as its own drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen you can choose to create the default layout or choose to manual partition using the 'Create custom layout' option of **Disk Druid**.

The first three options allow you to perform an automated installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to create a custom layout and instead let the installation program partition for you.

You can configure an SCSI target for installation, or disable a dmraid device from this screen by clicking on the 'Advanced storage configuration' button (see *Figure C-7* on page C-7).

RED HAT
ENTERPRISE LINUX 5
Installation requires partitioning of your hard drive. By default, a partitioning layout is chosen which is reasonable for most users. You can either choose to use this or create your own.
Remove linux partitions on selected drives and create default layout.
Select the drive(s) to use for this installation.
Advanced storage configuration
Review and modify partitioning layout
Release Notes
Back
Next

Figure C-7. Partitioning

Click **Next** to continue.

Step 8: Create default layout allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- Remove all partitions on selected drives and create default layout — select this option to remove all partitions on your storage drive(s) (this includes partitions created by other operating systems such as Windows VFAT or NTFS partitions).
- **Remove Linux partitions on selected drives and create default layout —** select this option to remove only Linux partitions (partitions created from a previous Linux installation).

  This does not remove other partitions you may have on your storage drive(s) (such as VFAT or FAT32 partitions).
- Use free space on selected drives and create default layout — select this option to retain your current data and partitions, assuming you have enough free space available on your storage drive(s).

Using your mouse, choose the storage drive(s) on which you want Red Hat Enterprise Linux to be installed. If you have two or more drives, you can choose which drive(s) should contain this installation. Unselected drives, and any data on them, are not touched.

To review and make any necessary changes to the partitions created by automatic partitioning, select the Review option. After selecting Review and clicking Next to move forward, the partitions created for you in Disk Druid appear. You can make modifications to these partitions if they do not meet your needs (see *Figure C-8*).

redhat.
Installation requires partitioning of your hard drive.
By default, a partitioning layout is chosen which is
reasonable for most users. You can either choose
Remove all partitions on selected drives and create default layout.
Remove linux partitions on selected drives and create default layout.
Use free space on selected drives and create default layout.
Create custom layout.
Advanced storage configuration
Review and modify partitioning layout
Release Notes
Back
Next

Figure C-8. Reviewing Option

Click **Next** once you have made your selections to proceed.

Step 9: If you chose one of the automatic partitioning options and selected Review, you can either accept the current partition settings (click Next), or modify the setup using Disk Druid, the manual partitioning tool.

If you chose to create a custom layout, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux is installed. You may also need to create and/or delete partitions at this time (see *Figure C-9* on page C-9).

Figure C-9. Creating a Custom Layout

Click **Next.**

Step 10: Once you have configured your partitions, set up a boot loader. If you select “No” Boot Loader will be Installed, you’ll need to use a third-party boot loader such as Partition Magic or Microsoft’s TLDR, unless you want to set up a Boot Loader Password or Configure Advanced Boot Loader Options (see *Figure C-10* on page C-10).

RED HAT
ENTERPRISE LINUX 5
The GRUB boot loader will be installed on /dev/sda.
No boot loader will be installed.
You can configure the boot loader to boot other operating systems. It will allow you to select an operating system to boot from the list. To add additional operating systems, which are not automatically detected, click 'Add.' To change the operating system booted by default, select 'Default' by the desired operating system.
Default
Label
Device
Red Hat Enterprise Linux Server
/dev/VolGroup00/LogVol00
Add
Edit
Delete
A boot loader password prevents users from changing options passed to the kernel. For greater system security, it is recommended that you set a password.
Use a boot loader password
Configure advanced boot loader options
Release Notes
Back
Next

Figure C-10. Setting Up Boot Loader

To configure more advanced boot loader options, such as changing the drive order or passing options to the kernel, be sure **Configure advanced boot loader options** is selected before clicking **Next**.

Step 11: Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

- **The master boot record (MBR)** — This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander.

The MBR is a special area on your storage drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB presents a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot (see *Figure C-11* on page C-11).

- **The first sector of your boot partition** — This is recommended if you are already using another boot loader on your system. In this case, your other boot loader takes control first. You can then configure that boot loader to start GRUB, which then boots Red Hat Enterprise Linux.

redhat
Install Boot Loader record on:
/dev/hda Master Boot Record (MBR)
/dev/hda1 First sector of boot partition
Change Drive Order
Force LBA32 (not normally required)
If you wish to add default options to the boot command, enter them into the 'General kernel parameters' field.
General kernel parameters
Release Notes
Back
Next

Figure C-11. Master Boot Record (MBR)

If your system only uses Red Hat Enterprise Linux, you should choose the MBR.

Click the **Change Drive Order** button if you would like to rearrange the drive order or if your BIOS does not return the correct drive order. Changing the drive order may be useful if you have multiple SCSI adapters, or both SCSI and IDE adapters, and you want to boot from the SCSI device.

Click **Next**.

Step 12: The installation program automatically detects any network devices you have and displays them in the **Network Devices** list (see *Figure C-12*).

Figure C-12. Network Devices List

Step 13: Once you have selected a network device, click **Edit**. From the **Edit Interface** pop-up screen, you can choose to configure the IP address and Netmask (for IPv4 - Prefix for IPv6) of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time. If you select **Activate on boot**, your network interface is started when you boot (see *Figure C-13* on page C-13).

If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator.

Figure C-13. Edit Interface Pop-Up Screen

Click **OK**.

Step 14: Set your time zone by selecting the city closest to your computer's physical location. Click on the map to zoom in to a particular geographical region of the world (see *Figure C-14* on page C-14).

From here there are two ways for you to select your time zone:

- Using your mouse, click on the interactive map to select a specific city (represented by a yellow dot). A red **X** appears indicating your selection.

- You can also scroll through the list at the bottom of the screen to select your time zone. Using your mouse, click on a location to highlight your selection.

Figure C-14. Selecting Time Zone

Click **Next**.

Step 15: Setting up a root account and password is one of the most important steps during your installation.

Your root account is similar to the administrator account used on Windows NT machines. The root account is used to install packages, upgrade RPMs, and perform most system maintenance.

Logging in as **root** gives you complete control over your system (see *Figure C-15* on page C-15).

Figure C-15. Setting Up Root Account and Password

Click **Next**.

Step 16: Now that you have made most of the choices for your installation, you are ready to confirm the default package selection or customize packages for your system.

The Package Installation Defaults screen appears and details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing (see *Figure C-16* on page C-16).

To customize your package set further, select the Customize now option on the screen. Clicking Next takes you to the Package Group Selection screen.

You can select package groups, which group components together according to function (for example, X Window System and Editors), individual packages, or a combination of the two.

To select a component, click on the checkbox beside it

RED HAT
ENTERPRISE LINUX 5
The default installation of Red Hat Enterprise Linux Server includes a set of software applicable for general internet usage. What additional tasks would you like your system to include support for?
Software Development
Web server
You can further customize the software selection now, or after install via the software management application.
Customize later
Customize now
Release Notes
Back
Next

Figure C-16. Package Installation Default Screen

Step 17: Select each component you wish to install.

Once a package group has been selected, if optional components are available you can click on Optional packages to view which packages are installed by default, and to add or remove optional packages from that group (see *Figure C-17* on page C-17). If there are no optional components this button will be disabled

Figure C-17. Optional Packages

Click **Next**.

Step 18: Once you have selected the package groups of your choice, you get one last chance to go back before starting the installation process. Click Next if you're happy with your choices, or click Back to make changes (see *Figure C-18* on page C-18).

RED HAT
ENTERPRISE LINUX 5
Click next to begin installation of Red Hat Enterprise Linux Server.
A complete log of the installation can be found in the file '/root/install.log' after rebooting your system.
A kickstart file containing the installation options selected can be found in the file '/root/anaconda-ks.cfg' after rebooting the system.
Release Notes
Back
Next

Figure C-18. Option to Review or Continue

Click **Next**.

Step 19: Installation Starts (see *Figure C-19* on page C-18).

Figure C-19. Installation Begins

Step 20: Congratulations! Your Red Hat Enterprise Linux installation is now complete!

The installation program prompts you to prepare your system for reboot. Remember to remove any installation media if it is not ejected automatically upon reboot (see *Figure C-20*).

RED HAT
ENTERPRISE LINUX 5
Congratulations, the installation is complete.
Remove any media used during the installation process and press the "Reboot" button to reboot your system.
Release Notes
Reboot

Figure C-20. Installation is Complete

After your computer's normal power-up sequence has completed, the graphical boot loader prompt appears at which you can do any of the following things:

- Press Enter — causes the default boot entry to be booted.
- Select a boot label, followed by Enter — causes the boot loader to boot the operating system corresponding to the boot label.
- Do nothing — after the boot loader's timeout period, (by default, five seconds) the boot loader automatically boots the default boot entry.

Do whatever is appropriate to boot Red Hat Enterprise Linux. One or more screens of messages should scroll by.

Step 21: Eventually, a login: prompt or a GUI login screen (if you installed the X Window System and chose to start X automatically) appears (see *Figure C-21*).

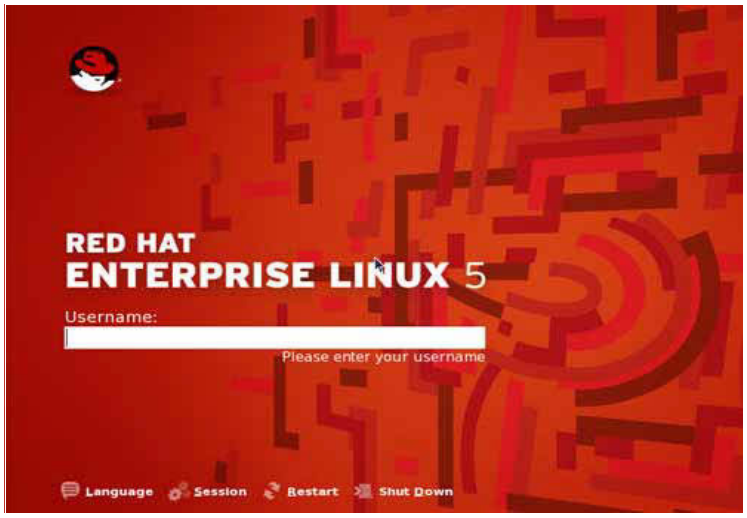

Figure C-21. Login Screen

Step 22: Once logged in, you are ready to use the desktop (see *Figure C-22*).

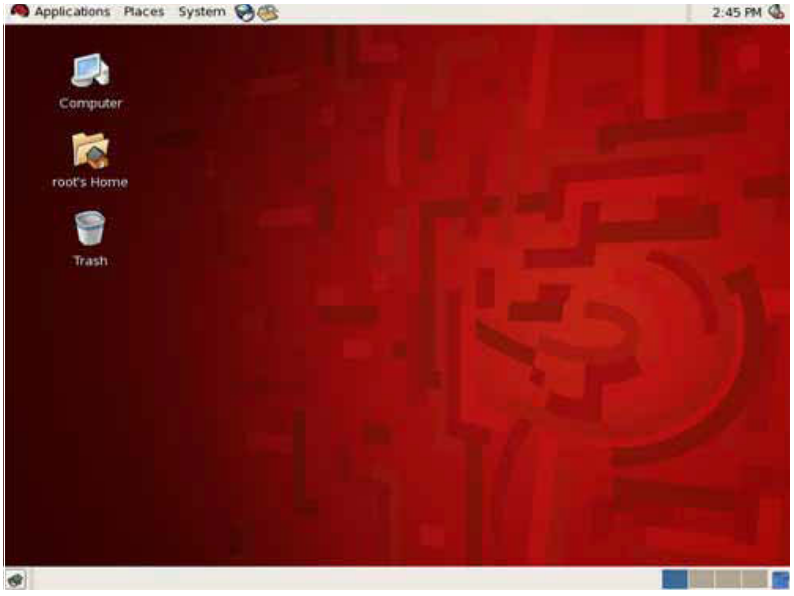

Figure C-22. Ready to use the Desktop

Appendix D

Repackaging Instructions

D.1 Repackaging for Shipment

If it becomes necessary for any reason to return your RES-NT1-1U unit back to Themis, it is very important that the original packaging materials be used according to the repackaging instructions found in this appendix. Themis has qualified all of its shipping materials to meet the highest of standards and the rigors of today's shipping methods, thus insuring total protection of your product during delivery. Failure to use original packaging materials, exactly as described in this appendix, **may invalidate the warranty**. If the original packaging is no longer serviceable, or no longer available, please contact Themis Customer Support for a new shipping box to send back your RES-NT1-1U.

Caution: Failure to use the original Themis packaging materials, and failure to follow the instructions of this Appendix D, **may invalidate the warranty**.

The following instruction assume the original packaging components are still available, and in serviceable condition. If not, please contact Themis for a new shipping box and packaging components for your RES-NT1-1U.

D.2 Packaging Components

The original packaging components are shown in *Figure D-1*. They comprise a packaging box, bottom foam layer, and two top foam layers. The two top foam layers are identical components, placed so that the rear most edge and front most edge touch the inner wall of the bottom foam layer. This will leave a small horizontal gap in the middle in which accessories will be placed *i.e., power cables.*

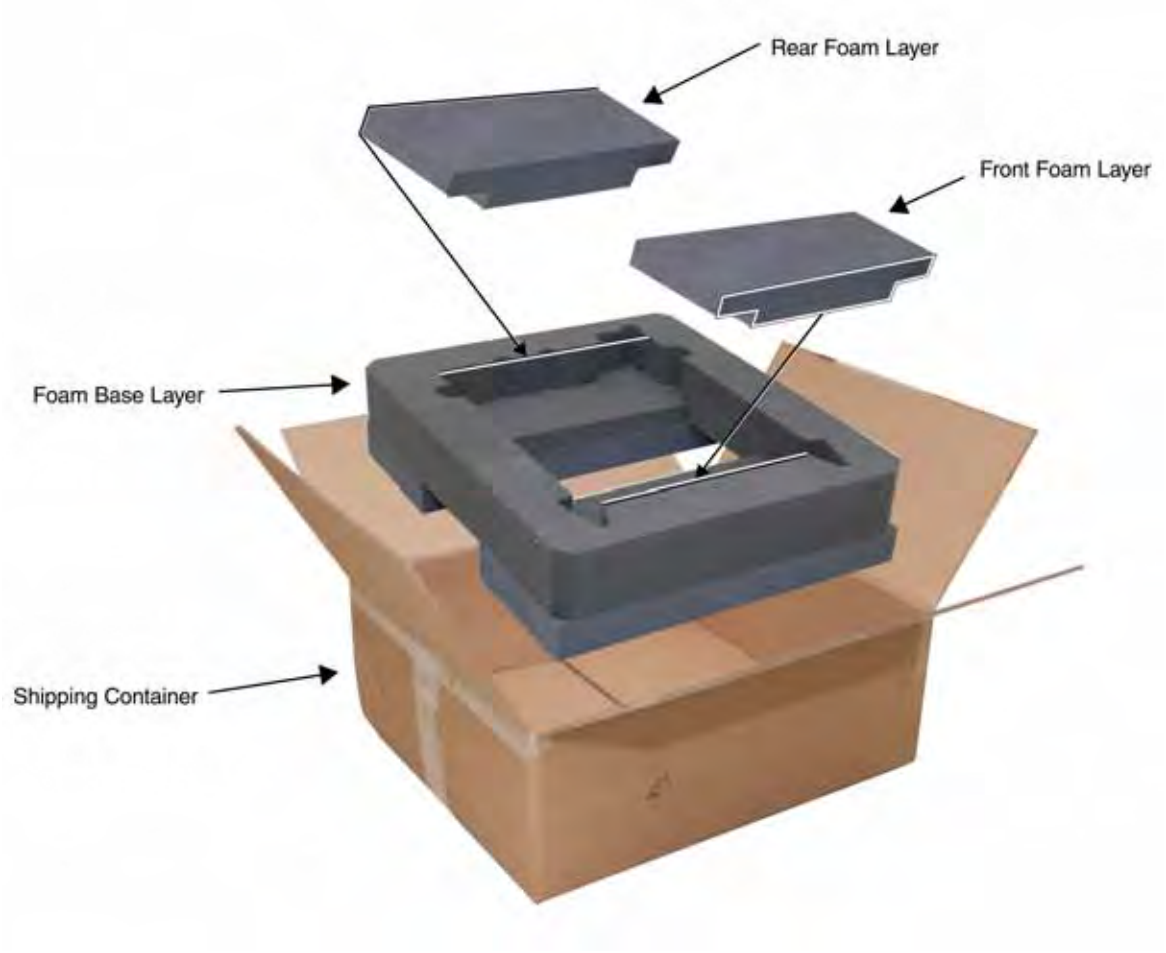

Figure D-1. Packaging Components

D.3 Instructions for Repackaging

Re-assemble the packaging material about the equipment in accordance with the following instructions (see *Figure D-2* on page D-4):

1. Inspect the original packing materials for serviceability.
2. Place the foam crush-resistant base layer in the bottom of the box.
3. Place the equipment in the cutout of the bottom layer, with the unit fitting snugly inside.
4. Place the two top crush-resistant layers, to the rear and front of the RES-NT1-1U. This will leave a small horizontal gap in which accessories can be placed.
5. Make sure all components of the box are firmly in place, pressing down on the surface area of the foam to insure proper seating of the material.
6. Seal the top of the box with strong packaging tape, wrapping the tape completely around the box, both lengthwise, and crosswise.
7. Prepare for shipment in accordance with the instructions received from Themis Computer.

Note: Please contact Themis if new packaging material, or shipping instructions are required. You can reach Themis at +1 (510) 252–0870 Mon—Fri, 8am—5pm PST, or by Email to support@themis.com.

The order of assembly when repackaging the RES-NT1-1U for shipment as shown in *Figure D-2*

Figure D-2. Order of Assembly

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Place
Stamp
Here

Themis Computer
47200 Bayside Parkway
Fremont, CA 94538
Attn: Publications Department

Fold here; tape at top to seal

Reader Comment Card

We welcome your comments and suggestions to help improve the *RES-22XR3/FIO Installation Manual*. Please take time to let us know what you think about this manual.

- Information provided in the manual was complete.

  Agree___ Disagree___ Not Applicable___

- Information was well documented and easy to follow.

  Agree___ Disagree___ Not Applicable___

- Information was easily accessible.

  Agree___ Disagree___ Not Applicable___

- The manual was useful.

  Agree___ Disagree___ Not Applicable___

- Please write down any comments you may have about this manual, including how it can be improved:

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RES-NT1-1U Installation Manual

Version 1.0

Part Number: 119905-024